BLUE EARTH COUNTY HIGHWAY DEPARTMENT
35 MAP DRIVE, MANKATO, MINNESOTA 56001

*************PROPOSAL*************

FOR HIGHWAY CONSTRUCTION
AND MAINTENANCE PROJECTS WITH
BIDS RECEIVED UNTIL 1:30 O'CLOCK P.M. ON APRIL 20, 2012

PROPOSAL OF _____
(NAME OF FIRM)

_____
(ADDRESS)

_____
(AREA CODE) TELEPHONE NUMBER

TO FURNISH AND DELIVER ALL MATERIALS AND TO PERFORM ALL WORK IN ACCORDANCE WITH THE CONTRACT, THE PLANS AND THE APPROVED DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION", 2005 EDITION, EXCEPT AS STATED OTHERWISE IN THE SPECIAL PROVISIONS WHICH ARE PART OF THIS PROPOSAL, FOR

STATE AID PROJECT NO. **S.A.P. 07-660-05 & S.A.P. 07-682-08**

COUNTY PROJECT NO. . **C.P. 7829**

LOCATION: CSAH 60 Between Map Drive & Victory Drive South, CSAH 82 Between 209th Street & Stadium Road, & Victory Drive Between CSAH 82 & Stadium Road,

TYPE OF WORK: Grading, Base, Bituminous Surface, & Ponds

LENGTH: 0.330, 0.368, & 0.048 Miles

STARTING DATE: See Special Provisions

COMPLETION DATE: See Special Provisions

NOTICE TO BIDDERS: In submitting a bid, you must return this complete proposal. You must initial changes made in the Schedule of Prices in the Proposal and acknowledge addenda on the back cover sheet.

I certify that this Proposal was prepared by me or under my direct supervision, and that I am a licensed professional engineer under the laws of the State of Minnesota.

_____

License Number 14720 Date: 27 Mar 12

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BID RIGGING IS A SERIOUS CRIME. IF YOU HAVE ANY INFORMATION CONCERNING COLLUSIVE BIDDING, EVEN A REQUEST TO SUBMIT A COMPLIMENTARY BID, PLEASE CALL THE MINNESOTA ATTORNEY GENERAL'S OFFICE AT TELE. NO. 651-296-1796

To Blue Earth County Board of Commissioners:
According to the advertisement of Blue Earth County inviting proposals for the improvement of the section of highway hereinbefore named, and in conformity with the Contract, Plans, Specifications and Special Provisions pertaining thereto, all on file in the office of the Auditor/Clerk of Blue Earth County:

(I)(We) hereby certify that (I am)(we are) the only person(s) interested in this proposal as principal(s); that this proposal is made and submitted without fraud or collusion with any other person, firm or corporation at all; that an examination has been made of the site of the work and the Contract form, with the Plans, Specifications and Special Provisions for the improvement.

(I)(We) understand that the quantities of work shown herein are approximate only and are subject to increase or decrease; that all quantities of work, whether increased or decreased within the limits specified in Mn/DOT 1903, are to be done at the unit prices shown on the attached schedule; that, at the time of opening bids, totals only will be read, but that comparison of bids will be based on the correct summation of item totals obtained from the unit prices bid, as provided in Mn/DOT 1301.

(I)(We) propose to furnish all necessary machinery, equipment, tools, labor and other means of construction and to furnish all materials specified, in the manner and at the time prescribed, all according to the terms of the Contract and Plans, Specifications, and the Special Provisions forming a part of this.

(I)(We) further propose to do all Extra Work that may be required to complete the contemplated improvement, at unit prices or lump sums to be agreed upon in writing before starting such work, or if such prices or sums cannot be agreed upon, to do such work on a Force Account basis, as provided in Mn/DOT 1904.

(I)(We) further propose to execute the form of Contract within 10 days after receiving written notice of award, as provided in Mn/DOT 1306.

(I)(We) further propose to furnish a payment bond equal to the Contract amount, and a performance bond equal to the Contract amount, with the aggregate liability of the bond(s) equal to twice the full amount of the Contract if the contract is less than or equal to five million dollars ($5,000,000.00), or if the contract is in excess of five million dollars ($5,000,000.00) the aggregate liability shall be equal to the amount of the contract, as security for the construction and completion of the improvement according to the Plans, Specifications and Special Provisions as provided in Mn/DOT 1305.

(I)(We) further propose to do all work according to the Plans, Specifications and Special Provisions, and to renew or repair any work that may be rejected due to defective materials or workmanship, before completion and acceptance of the Project by Blue Earth County.

(I)(We) agree to all provisions of Minnesota Statutes, Section 181.59.

(I)(We) further propose to begin work and to prosecute and complete the same according to the time schedule set forth in the Special Provisions for the improvement.

(I)(We) assign to Blue Earth County all claims for overcharges as to goods and materials purchased in connection with this Project resulting from antitrust violations that arise under the antitrust laws of the United States and the antitrust laws of the State of Minnesota. This clause also applies to subcontractors and first tier suppliers under this Contract.

NOTICE TO ALL BIDDERS

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

DEPARTMENT OF TRANSPORTATION

NOTICE OF DEBARMENT

NOTICE IS HEREBY GIVEN that MnDOT has ordered that the following vendors be debarred for a period of three (3) years, effective February 24, 2010 until February 24, 2013:

- Joseph Edward Riley, Morris, MN
- John Thomas Riley, Morris, MN

NOTICE IS HEREBY GIVEN that MnDOT has ordered that the following vendors be debarred for a period of three (3) years, effective March 25, 2011 until March 25, 2014:

- Philip Joseph Franklin, Leesburg, VA
- Franklin Drywall, Inc. and its affiliates, Little Canada, MN
- Master Drywall, Inc. and its affiliates, Little Canada, MN

NOTICE OF SUSPENSION

NOTICE IS HEREBY GIVEN that the Department of Transportation ("MnDOT") has ordered that the following vendors be suspended for a period of sixty (60) days, effective February 10, 2012 until April 10, 2012:

- Marlon Louis Danner and his affiliates, South St. Paul, MN
- Danner, Inc. and its affiliates, South St. Paul, MN
- Bull Dog Leasing, Inc. and its affiliates, Inver Grove Heights, MN
- Danner Family Limited Partnership and its affiliates, South St. Paul, MN
- Ell-Z Trucking, Inc. and its affiliates, South St. Paul, MN

Minnesota Statute section 161.315 prohibits the Commissioner, counties, towns, or home rule or statutory cities from awarding or approving the award of a contract for goods or services to a person who is suspended or debarred, including:

1) any contract under which a debarred or suspended person will serve as a subcontractor or material supplier,
2) any business or affiliate which the debarred or suspended person exercises substantial influence or control, and
3) any business or entity, which is sold or transferred by a debarred person to a relative or any other party over whose actions the debarred person exercises substantial influence or control, remains ineligible during the duration of the seller's or transfer's debarment.

DEPARTMENT OF ADMINISTRATION

As of the date of this notice and in accordance with Minnesota Rules 1230.1150, the Minnesota Department of Administration has debarred and disqualified the following persons and businesses from entering into or receiving a State of Minnesota contract:

NAME	DATE OF DEBARMENT
Alternative Counseling Clinic 337 97th Lane NE Minneapolis, MN 55434	Oct. 22, 2008 through Oct. 22, 2011 (eligible for reinstatement on Oct. 22, 2012)
Bull Dog Leasing, Inc. 7854 Danner Court Inver Grove Heights, MN 55076	Aug. 30, 2011 through Aug. 30, 2014 (eligible for reinstatement on Aug. 30, 2015)
Danner Family Ltd. Ptnship. 843 Hardman Ave. S. S. St. Paul, MN 55075	Aug. 30, 2011 through Aug. 30, 2014 (eligible for reinstatement on Aug. 30, 2015)
Danner, Inc. 843 Hardman Ave. S. S. St. Paul, MN 55075	Aug. 30, 2011 through Aug. 30, 2014 (eligible for reinstatement on Aug. 30, 2015)
Ell-Z Trucking, Inc. 843 Hardman Ave. S. S. St. Paul, MN 55075	Aug. 30, 2011 through Aug. 30, 2014 (eligible for reinstatement on Aug. 30, 2015)
Franklin Drywall, Inc. 43279 Fieldsview Crt. Leesburg, VA 20176	March 25, 2011 through March 25, 2014 (eligible for reinstatement on March 25, 2015)
Master Drywall, Inc. 43279 Fieldsview Crt. Leesburg, VA 20176	March 25, 2011 through March 25, 2014 (eligible for reinstatement on March 25, 2015)
Polyphase Electric Company 2515 West Superior Street Duluth, MN 55816-0151	May 5, 2010 through May 5, 2011 (eligible for reinstatement on May 5, 2012)
Riley Brothers Construction PO Box 535 Morris, MN 56267	Nov. 9, 2009 through Nov. 9, 2012

Minnesota Administrative Rule part 1230.1150, subpart 6 requires the Materials Management Division to maintain a master list of all suspensions and debarments. The master list must retain all information concerning suspensions and debarments as a public record for at least three (3) years following the end of a suspension or debarment. Refer to the following website for the master list: http://www.mmd.admin.state.mn.us/debarredreport.asp.

If the project is financed in whole or in part with federal funds, refer to the following website for vendors debarred by federal government agencies: https://www.epls.gov/.

STATE FUNDED CONSTRUCTION CONTRACTS
SPECIAL PROVISIONS DIVISION A - LABOR
April 7, 2006

I. PREAMBLE

It is in the public interest that public buildings and other public works projects be constructed and maintained by the best means and the highest quality of labor reasonably available and that persons working on public works projects be compensated according to the real value of the services they perform.[1]

Therefore, the department shall administer this contract pursuant to the **State of Minnesota Statutes and Rules, MN/DOT's Standard Specifications for Construction, MN/DOT's Contract Administration Manual, MN/DOT's State Aid Manual** and applicable federal labor regulations.

II. DEFINITIONS[2]

A. **Contract**: The written agreement between the contracting authority and the prime contractor setting forth their obligations, including, but not limited to, the performance of the work, the furnishing of labor and materials, the basis of payment, and other requirements contained in the contract documents.

B. **Contracting Authority**: The political subdivision, governmental body, board, department, commission, or officer making the award and execution of contract as the party of the first part.

C. **Contractor**: The term "contractor" in these provisions shall include the prime contractor, subcontractor, agent, or other person doing or contracting to do all or part of the work under this contract.[3]

D. **Department**: The Department of Transportation of the State of Minnesota, or the political subdivision, governmental body, board, commission, office, department, division, or agency constituted for administration of the contract work within its jurisdiction.

E. **First Tier Subcontractor**: An individual, firm, corporation, or other entity to which the prime contractor sublets part of the contract.

F. **Independent Truck Owner/Operator (ITO)**: An individual, partnership, or principal stockholder of a corporation who owns or holds a vehicle under lease and who contracts that vehicle and the owner's services to an entity that provides construction services to a public works project.[4]

G. **Laborer or Mechanic**: A worker in a construction industry labor class identified in or pursuant to Minnesota Rules 5200.1100, Master Job Classifications.[5]

H. **Plan**: The plan, profiles, typical cross-sections, and supplemental drawings that show the locations, character, dimensions, and details of the work to be done.

I. **Prime Contractor**: The individual, firm, corporation, or other entity contracting for and undertaking prosecution of the prescribed work; the party of the second part to the contract, acting directly or through a duly authorized representative.

J. **Project**: The specific section of the highway, the location, or the type of work together with all appurtenances and construction to be performed under the contract.

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[1] Minnesota Statute 177.41
[2] MN/DOT Standard Specifications for Construction, Section 1103
[3] Minnesota Statute 177.44, Subdivision 1
[4] Minnesota Rules 5200.1106, Subpart 7(A)
[5] Minnesota Rules 5200.1106, Subpart 5(A)

K. **Second Tier Subcontractor**: An individual, firm, corporation, or other entity to which a first tier subcontractor sublets part of the contract.

L. **Special Provisions**: Additions and revisions to the standard and supplemental specifications covering conditions peculiar to an individual project.

M. **Specifications**: A general term applied to all directions, provisions, and requirements pertaining to performance of the work.

N. **Subcontractor**: An individual, firm, corporation, or other entity to which the prime contractor or subcontractor sublets part of the contract.

O. **Substantially In Place**: Mineral aggregate is deposited on the project site directly or through spreaders where it can be spread from or compacted at the location where it was deposited.[6]

P. **Trucking Broker**: An individual or business entity, the activities of which include, but are not limited to: contracting to provide trucking services in the construction industry to users of such services, contracting to obtain such services from providers of trucking services, dispatching the providers of the services to do work as required by the users of the services, receiving payment from the users in consideration of the trucking services provided and making payment to the providers for the services.[7]

Q. **Trucking Firm/Multiple Truck Owner (MTO)**: Any business entity that owns more than one vehicle and hires the vehicles out for services to brokers or contractors on public works projects.[8]

R. **Work**: The furnishing of all labor, materials, equipment, and other incidentals necessary or convenient to the successful completion of the project and the carrying out of all the duties and obligations imposed by the contract upon the contractor. Also used to indicate the construction required or completed by the contractor.

III. SCOPE – SPECIAL PROVISIONS DIVISION A & CONTRACT

A. These provisions shall apply to this contract, which is funded in whole or part with state funds.[9]

B. These provisions shall apply to the prime contractor and all subcontractors contracting to do all or part of the work under this contract.[10]

C. The provisions established in this document do not necessarily represent all federal, state, and local laws, ordinances, rules and regulations. It is the responsibility of the prime contractor to inform itself and all subcontractors about other regulations that may be applicable to this contract.

D. The prime contractor is responsible to ensure that each subcontractor performing work under this contract receives copies of all required contract provisions. These provisions shall be incorporated into written subcontracts and must be displayed on the poster board.[11]

E. The department shall administer this contract in accordance with all applicable state statutes and rules,[12] along with the plans, specifications and provisions, which are incorporated into and found elsewhere in this contract.

F. An unpublished decision from the Minnesota Court of Appeals affirms the authority of the Minnesota Commissioner of Transportation to enforce the Minnesota Prevailing Wage Law on a case-by-case basis.[13]

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[6] Minnesota Rules 5200.1106, Subpart 5(C)
[7] Minnesota Rules 5200.1106, Subpart 7(C)
[8] Minnesota Rules 5200.1106, Subpart 7(B)
[9] Minnesota Statute 177.41
[10] Minnesota Statute 177.44, Subdivision 1
[11] Minnesota Statute 177.44, Subdivision 5
[12] Minnesota Rules 8820.3000, Subpart 2
[13] Minnesota Court of Appeals Case Number: C6-97-1582

G. For additional information refer to: www.dot.state.mn.us/const/labor/.

IV. PAYROLLS AND STATEMENTS

A. All contractors shall submit a payroll statement to the department.[14] The statement shall be submitted based on the contractor's payment schedule. If a contractor pays its employees weekly, a payroll statement shall be submitted weekly. If a contractor pays its employees biweekly, a payroll statement shall be submitted biweekly.[15] All contractors shall pay its employees at least once every 15 days on a date designated in advance by the employer.[16] Each statement submitted shall include all employees that performed work under this contract and provide at a minimum the following information:[17]

1. Contractor's name, address, and telephone number.
2. State project number.
3. Payroll report number.
4. Project location.
5. Workweek ending date.
6. Name, social security number, and home address for each employee.
7. Labor classification(s) and/or three-digit code for each employee.
8. Hourly straight time and overtime wage rates paid to each employee.
9. Daily and weekly hours worked in each labor classification, including overtime hours for each employee.
10. Authorized legal deductions for each employee.
11. Project gross amount, weekly gross amount and net wages paid to each employee.

B. Payroll records may be submitted in any form provided it includes all the information contained in **Subpart A (1 - 11)** of this section. However, contractors needing a payroll form may utilize the "front side" of the **U.S. Department of Labor's, WH-347 - Payroll Form**. This form is available by visiting the Labor Compliance website.[18]

C. All payroll records must be accompanied with a completed and signed **MN/DOT, 21658 - Statement of Compliance Form**.[19]

D. The prime contractor is responsible for assuring that its payroll records and those of all subcontractors include all employees that performed work under this contract and accurately reflect the hours worked, regular and overtime rates of pay and classification of work performed.[20]

E. The prime contractor is responsible to maintain all certified payroll records, including those of all subcontractors, throughout the course of a construction project and retain all records for a period of three years after the final contract voucher has been issued.[21]

F. At the end of each pay period, each contractor shall provide every employee, in writing, an accurate, detailed earnings statement.[22]

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[14] Minnesota Statute 177.44, Subdivision 7
[15] Mn/DOT Contract Administration Manual, Section .320
[16] Minnesota Statute 181.10
[17] Minnesota Rules 5200.1106, Subpart 10 and Minnesota Statute 177.30
[18] www.dot.state.mn.us/const/labor/
[19] Minnesota Rules 5200.1106, Subpart 10
[20] Minnesota Statute 177.30(1)(2)(3)(4)
[21] Minnesota Statute 177.30(4)
[22] Minnesota Statute 181.032

G. Upon request from the Minnesota Department of Labor and Industry (MN/DLI) or the Department, the prime contractor shall promptly furnish copies of payroll records for its workers and those of all subcontractors, along with other records, deemed appropriate by the requesting agency to determine compliance with these contract provisions.[23]

H. At the department's discretion, the project engineer may administer the submission of payroll records according to MN/DOT's Payroll Maintenance Program. The guidelines for the implementation and administration of this program are outlined in the **MN/DOT Contract Administration Manual, Section A(4)(d)**.

I. If, after written notice, the prime contractor fails to submit its payroll reports and certification forms and those of any subcontractor, the department may implement the actions prescribed in section **XVI (NON-COMPLIANCE AND ENFORCEMENT).**

V. WAGE RATES

A. The prime contractor is responsible to ensure that its workers and those of all subcontractors are compensated according to the MN/DLI state prevailing wage determination(s) incorporated into and found elsewhere in this contract. All contractors shall pay each worker the required minimum total hourly wage rate for all hours worked on the project and for the appropriate classification of labor.

1. State highway and heavy wage determinations are issued for ten separate regions throughout the state of Minnesota. If the contract work is located in more than one region, the applicable wage decision for each region shall be incorporated into and found elsewhere in this contract. If this contract contains multiple state highway and heavy wage determinations, there shall be only one standard of hours of labor and wage rates.[24]

2. State commercial wage determinations are issued for each county throughout the state of Minnesota. If the contract work is located in more than one county, the applicable wage determination for each county shall be incorporated into and found elsewhere in this contract. If this contract contains multiple state commercial wage determinations, there shall be only one standard of hours of labor and wage rates.[25]

B. Wage rates listed in the state wage determination(s) contain two components: the hourly basic rate and the fringe rate; together they equal the total prevailing wage rate. A contractor shall compensate a worker at a minimum, a combination of cash and fringe benefits equaling the total prevailing wage rate.[26]

C. The applicable certified wage decision(s) incorporated into and found elsewhere in this contract remain in effect for the life of this contract. The wage decision(s) do not necessarily represent the workforce that can be obtained at the rates certified by the MN/DLI. It is the responsibility of the prime contractor and any subcontractor to inform themselves about local labor conditions and prospective changes or adjustments to the wage rates. No increase in the contract price shall be allowed or authorized due to wage rates that exceed those incorporated into this contract.

D. A contractor shall not reduce a worker's private, regular rate of pay when the wage rate certified by the MN/DLI is less than the worker's normal hourly wage.[27]

E. From the time a worker is required to report for duty at the project site until the worker is allowed to leave the site, no deductions shall be made from the worker's hours for any delays of less than twenty consecutive minutes.[28]

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[23] Minnesota Statute 177.44, Subdivision 7 and Minnesota Rules 5200.1106, Subpart 10
[24] Minnesota Statute 177.44, Subdivision 4
[25] Minnesota Statute 177.44, Subdivision 4
[26] Minnesota Statute 177.42, Subdivision 6
[27] Minnesota Statute 181.03, Subdivision 1(2)
[28] Minnesota Rules 5200.0120,Subpart 1

F. In situations where a delay may exceed twenty consecutive minutes and the contractor requires a worker to remain on the premises or so close to the premises that the worker cannot use the time effectively for the worker's own purposes, the worker is considered "on-call"[29] and shall be compensated in accordance with **Subpart B** of this section, unless the worker is allowed or required to leave the project site.

G. A contractor making payment to an employee, laborer, mechanic, worker, or truck owner-operator shall not accept a rebate for the purpose of reducing or otherwise decreasing the value of the compensation paid.[30]

H. Any employee who knowingly permits a contractor to pay less than the total prevailing wage or gives up any part of the compensation to which the employee is entitled may be subject to penalties.[31]

VI. BONA FIDE FRINGE BENEFITS

A. A "funded" fringe benefit plan is one that allows the contractor to make irrevocable contributions on behalf of an employee to a financially responsible trustee, third person, fund, plan or program, without prior approval from the U.S. Department of Labor. Types of "funded" fringe benefits may include, but are not limited to: pension, health and life insurance.[32]

B. An "unfunded" fringe benefit plan or program is one that allows the contractor to furnish an in-house benefit on behalf of an employee. The cost to provide the benefit is funded from the contractor's general assets rather than funded by contributions made to a trustee, third person, fund, plan or program. Types of "unfunded" fringe benefits may include, but are not limited to: holiday plans, vacation plans and sick plans.[33]

C. Credit toward the total prevailing wage rate shall be determined for each individual employee and is allowed for bona fide fringe benefits that:[34]

1. include contributions irrevocably made by a contractor on behalf of an employee to a financially responsible trustee, third person, fund, plan, or program;
2. are legally enforceable;
3. have been communicated in writing to the employee; and
4. are made available to the employee once he/she has met all eligibility requirements.

D. No credit shall be allowed for benefits required by federal, state or local law, such as: worker's compensation, unemployment compensation, and social security contributions.[35]

E. Upon request from the Minnesota Department of Labor and Industry (MN/DLI) or the Department, the prime contractor shall promptly furnish copies of fringe benefit records for its workers and those of all subcontractors, along with other records, deemed appropriate by the requesting agency to determine compliance with these contract provisions.[36]

F. In addition to the requirements set forth in **Subpart C** of this section, it is the responsibility of the prime contractor and any subcontractor to inform themselves about other federal and state fringe benefit regulations that may be applicable to this contract.

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[29] Minnesota Rules 5200.0120, Subpart 2
[30] Minnesota Rules 5200.1106, Subpart 6
[31] Minnesota Statute 177.44, Subdivision 6
[32] 29 CFR Parts 5.26 and 5.27
[33] 29 CFR Part 5.28
[34] 29 CFR Part 5.23
[35] 29 CFR Part 5.29(f)
[36] Minnesota Statute 177.44, Subdivision 7 and Minnesota Rules 5200.1106, Subpart 10

G. Contractors shall submit a completed and signed **MN/DOT, 21658 - Statement of Compliance Form,** identifying any fringe contributions made on behalf of a worker.[37] The form must be submitted in accordance with section **IV (PAYROLLS AND STATEMENTS), Subparts A and C.**

H. Pursuant with ***Minnesota Statute 181.74, Subdivision 1***, a contractor that is obligated to deposit fringe benefit contributions on behalf of its employees into a financially responsible trustee, third person, fund, plan, or program and fails to make timely contributions may be guilty of a gross misdemeanor. A contractor found in violation of the above-mentioned statute shall compel the department to take such actions as prescribed in section **XVI, (NON-COMPLIANCE AND ENFORCEMENT).**

VII. OVERTIME

A. A contractor shall not permit or require a worker to work longer than the prevailing hours of labor unless the worker is paid for all hours in excess of the prevailing hours at a rate of at least 1-1/2 times the hourly basic hourly rate of pay.[38] The prevailing hours of labor is defined as not more than 8 hours per day or more than 40 hours per week.[39]

B. In addition to the requirements set forth in **Subpart A** of this section, it is the responsibility of the prime contractor and any subcontractor to inform themselves about other federal and state overtime regulations that may be applicable to this contract.

VIII. LABOR CLASSIFICATIONS

All contractors shall refer to the state wage determination(s) incorporated into and found elsewhere in this contract or the Master Job Classification List[40] to obtain an applicable job classification. If a contractor cannot determine an appropriate job classification, state law requires that the worker be assigned a job classification that is the "same or most similar".[41] Contractors needing clarification shall contact MN/DLI or the MN/DOT Labor Compliance Unit at (651) 296-6503.

IX. INDEPENDENT CONTRACTORS, OWNERS, SUPERVISORS AND FOREMAN

A. An independent contractor performing work as a laborer or mechanic is subject to the contract prevailing wage requirements[42] for the classification of work performed and shall adhere to the requirements established in sections **IV (PAYROLLS AND STATEMENTS); V (WAGE RATES); VI (FRINGE BENEFITS); VII (OVERTIME) and VIII (LABOR CLASSIFICATIONS).** In order to ensure compliance, the department may examine the subcontract agreement to determine if the bid price submitted covers the applicable prevailing wage rate for the number of hours worked, along with other records, deemed appropriate by the department.[43]

B. Pursuant with state regulations, owners, supervisors and foreman performing work under the contract[44] shall be compensated in accordance with section **V (WAGE RATES).** Furthermore, the prime contractor and any subcontractor shall adhere to the requirements established in sections **IV (PAYROLLS AND STATEMENTS); VI (FRINGE BENEFITS); VII (OVERTIME) and VIII (LABOR CLASSIFICATIONS).**

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[37] Minnesota Rules 5200.1106, Subpart 10
[38] Minnesota Statute 177.44, Subdivision 1
[39] Minnesota Statute 177.42, Subdivision 4
[40] Minnesota Rules 5200.1100
[41] Minnesota Statute 177.44, Subdivision 1
[42] 29 CFR Part 5.2(o) and Minnesota Statute 177.41
[43] Minnesota Statute 177.44, Subdivision 7 and Minnesota Rules 5200.1106, Subpart 10
[44] Minnesota Statute 177.44, Subdivision 1

X. APPRENTICES, TRAINEES AND HELPERS

A. An apprentice is not subject to the state wage decision(s) incorporated into and found elsewhere in this contract, provided the contractor can demonstrate compliance with **Subparts (1 - 4)** of this section: [45]

1. The apprentice is performing the work of his/her trade.
2. The apprentice is registered with the U.S. DOL Bureau of Apprenticeship and Training or MN/DLI Division of Voluntary Apprenticeship.
3. The apprentice is compensated according to the rate specified in the program for the level of progress.
4. The ratio of apprentices to journeyman workers on the project is not greater than the ratio permitted for the contractor's entire work force under the registered program.[46]

B. If a contractor fails to demonstrate compliance with the terms established in **Subpart A (1 – 4)** of this section, the contractor shall compensate the worker not less than the applicable total prevailing wage rate for the actual work performed.[47]

C. A trainee and a helper are not exempt under state law; the contractor shall assign the trainee or helper a job classification that is the "same or most similar"[48] and compensate the trainee or helper for the actual work performed regardless of the trainee's or helper's skill level.

XI. SUBCONTRACTING PART OF THIS CONTRACT[49]

A. If the prime contractor intends to sublet any portion of this contract, it shall complete and submit a **MN/DOT, TP-21834, Request To Sublet Form** to the project engineer 10 days prior to the first day of work for any subcontractor.

B. The prime contractor shall not subcontract any portion of this contract without prior written consent from the project engineer.

C. The prime contractor's organization shall perform work amounting to not less than 40 percent of the total original contract cost. However, contracts with Disadvantaged Business Enterprise (DBE) or Targeted Group Business (TGB) established goals, or both, the contractor's organization shall perform work amounting to not less than 30 percent of the total original contract cost.

D. A first tier subcontractor shall not subcontract any portion of its work under this contract unless approved by the prime contractor and the project engineer. In addition, a first tier subcontractor may only subcontract up to 50% of its original subcontract.

E. A second tier subcontractor shall not subcontract any portion of its work under this contract.

F. Written consent to subcontract any portion of this contract does not relieve the prime contractor of liabilities and obligations under the contract and bonds.

G. Contractors shall not subcontract with or purchase materials or services from a debarred or suspended person.[50]

XII. POSTER BOARDS

A. The prime contractor shall construct and display a poster board, which contains all required posters, is complete, accurate, legible and accessible to all workers from the first day of work

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[45] Minnesota Rules 5200.1070
[46] MN/DOLI Division of Apprenticeship – April 6, 1995 Memorandum from Jerry Briggs, Director
[47] Minnesota Rules 5200.1070, Subpart 3
[48] Minnesota Statute 177.44, Subdivision 1
[49] MN/DOT Standard Specifications for Construction, Section 1801
[50] Minnesota Statute 161.315, Subdivision 3(3)

until the project is 100 percent complete.[51] The prime contractor is not allowed to place a poster board at an off-site location.

B. The prime contractor can obtain the required posters by contacting MN/DOT at (651) 366-3091. The prime contractor will need to furnish its name, mailing address, the type of posters (state-aid) and the quantity needed.

C. Refer to the poster board section of the Labor Compliance website to obtain applicable contact information for each poster. The link to the website can be found in section **III (SCOPE – SPECIAL PROVISIONS DIVISION A & CONTRACT), Subpart G** of these provisions.

XIII. EMPLOYEE INTERVIEWS

At any time the prime contractor shall permit representatives from MN/DLI or the Department to interview its workers and those of any subcontractor during working hours on the project.[52]

XIV. TRUCKING / OFF-SITE FACILITIES

A. The prime contractor is responsible to ensure that its workers and those of all subcontractors, are compensated in accordance with the state wage determination(s) incorporated into and found elsewhere in this contract for the following work duties:

1. The processing or manufacturing of material, including the hauling of material to and from a prime contractor's material operation that is not a separate commercial establishment.[53]
2. The processing or manufacturing of material, including the hauling of material to and from an off-site material operation that is not considered a commercial establishment. [54]
3. The hauling of any or all stockpiled or excavated materials on the project work site to other locations on the same project even if the truck leaves the work site at some point.[55]
4. The delivery of materials from a non-commercial establishment to the project and the return haul.[56]
5. The delivery of materials from another construction project site to the public works project and the return haul, either empty or loaded. Construction projects are not considered commercial establishments.[57]
6. The hauling required to remove any materials from the project to a location off the project site and the return haul, either empty or loaded from other than a commercial establishment.[58]
7. The delivery of mineral aggregate materials from a commercial establishment, which is deposited "substantially in place" and the return haul, either empty or loaded.[59]

B. The work duties prescribed in **Subpart A (1 - 7)** of this section do not represent all possible hauling activities and/or other work duties that may be performed under this contract. It is the responsibility of the prime contractor to inform itself and all subcontractors about other applicable job duties that may be subject to the contract labor provisions. Refer to the Labor Compliance website for additional information regarding trucking regulations.

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[51] Minnesota Statute 177.44, Subdivision 5
[52] MN/DOT Standard Specifications for Construction, Section 1511
[53] ALJ Findings of Fact, Conclusions of Law, and Recommendation, Conclusions (7), Case #12-3000-11993-2
[54] Minnesota Rules 5200.1106, Subpart 3B(2)
[55] Minnesota Rules 5200.1106, Subpart 3B(1)
[56] Minnesota Rules 5200.1106, Subpart 3B(2)
[57] Minnesota Rules 5200.1106, Subpart 3B(3)
[58] Minnesota Rules 5200.1106, Subpart 3B(4)
[59] Minnesota Rules 5200.1106, Subpart 3B(5)(6)

C. A contractor acquiring trucking services from an ITO, MTO and/or Truck Broker to perform and/or provide "covered" hauling activities shall comply with the payment of the certified state truck rental rates,[60] which are incorporated into and found elsewhere in this contract.

D. Each month, in which hauling activities were performed under this contract, the prime contractor and all subcontractors shall submit a **MN/DOT, TP-90550 - Month-End Trucking Report** and **MN/DOT, TP-90551 - Statement of Compliance Form**, along with each ITOs, MTOs and/or Truck Brokers reports to the department.[61] The specifications regarding the dates for submission can be found near the bottom of the **MN/DOT, TP-90551 - Statement of Compliance Form.**

E. A Truck Broker contracting to provide trucking services in the construction industry may charge a reasonable broker fee to the provider of trucking services.[62] The prime contractor and any subcontractor contracting to receive trucking services shall not assess a broker fee.

F. A contractor with employee truck drivers shall adhere to the requirements established in sections **IV (PAYROLLS AND STATEMENTS); V (WAGE RATES); VI (FRINGE BENEFITS); VII (OVERTIME) and VIII (LABOR CLASSIFICATIONS).**

G. If after written notice, the prime contractor fails to submit its month-end trucking reports and certification forms and those of any subcontractor, MTO and/or Truck Broker, the department may take such actions as prescribed in section **XVI, (NON-COMPLIANCE AND ENFORCEMENT).**

XV. CHILD LABOR

A. Except as permitted under **Subpart B** of this section, no worker under the age of 18 is allowed to perform work on construction projects.[63]

B. In accordance with state law, a worker under the age of 18, employed in a corporation totally owned by one or both parents that is supervised by the parent(s), may perform work on construction projects.[64] However, if this contractor is subject to the federal Fair Labor Standards Act, a worker under the age of 18 is not allowed to perform work in a hazardous occupation.[65]

C. To protect the interests of the department, the project engineer may remove a worker that appears to be under the age of 18 from the construction project until the contractor or worker can demonstrate proof of age[66] and compliance with all applicable federal and/or state regulations.[67]

XVI. NON-COMPLIANCE AND ENFORCEMENT

A. The prime contractor shall be liable for any unpaid wages to its workers or those of any subcontractor, ITO, MTO and/or Truck Broker.[68]

B. If it is determined that a contractor has violated the state prevailing wage law, or any portion of this contract, the department after written notice, may implement one or more of the following sanctions:

1. Withhold or cause to be withheld from the prime contractor such amounts in considerations or assessments against the prime contractor, whether arising from this contract or other contract with the department.[69]

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[60] Minnesota Rules 5200.1106, Subpart 1
[61] Minnesota Rules 5200.1106, Subpart 10
[62] Minnesota Rules 5200.1106, Subpart 7(C)
[63] Minnesota Rules 5200.0910, Subpart F
[64] Minnesota Rules 5200.0930, Subpart 4
[65] 29 CFR Part 570.2(a)(ii)
[66] Minnesota Statute 181A.06, Subdivision 4
[67] MN/DOT Standard Specifications for Construction, Section 1701
[68] MN/DOT Standard Specifications for Construction, Section 1801
[69] MN/DOT Standard Specifications for Construction, Section 1906

2. The department may reject a bid from a prime contractor that has demonstrated continued or persistent noncompliance with the prevailing wage law on previous or current contracts with the department.[70]

3. The department may take the prosecution of the work out of the hands of the prime contractor, place the contractor in default and terminate this contract for failure to demonstrate compliance with these provisions.[71]

C. Any contractor who violates the state prevailing wage law is guilty of a misdemeanor and may be fined not more than $300 or imprisoned not more than 90 days or both. Each day that the violation continues is a separate offense.[72]

D. All required documents and certification reports are legal documents; willful falsification of the documents may result in civil action and/or criminal prosecution[73] and may be grounds for debarment proceedings.[74]

[70] Minnesota Statute 161.32, Subdivision 1(d)
[71] MN/DOT Standard Specifications for Construction, Section 1808
[72] Minnesota Statute 177.44, Subdivision 6
[73] Minnesota Statutes 16B, 161.315, Subdivision 2, 177.43,Subdivision 5 177.44, Subdivision 6, 609.63
[74] Minnesota Statute 161.315 and Minnesota Statute 609.63

NOTICE TO BIDDERS

Minnesota Statutes that require prompt payment to subcontractors:

471.425 Prompt payment of local government bills.

Subd. 1. Definitions. For the purposes of this section, the following terms have the meanings here given them.

(d) "Municipality" means any home rule charter or statutory city, county, town, school district, political subdivision or agency of local government. "Municipality" means the metropolitan council or any board or agency created under chapter 473.

Subd. 4a. Prompt payment to subcontractors.

Each contract of a municipality must require the prime contractor to pay any subcontractor within ten days of the prime contractor's receipt of payment from the municipality for undisputed services provided by the subcontractor. The contract must require the prime contractor to pay interest of 1-1/2 percent per month or any part of a month to the subcontractor on any undisputed amount not paid on time to the subcontractor. The minimum monthly interest penalty payment for an unpaid balance of $100 or more is $10. For an unpaid balance of less than $100, the prime contractor shall pay the actual penalty due to the subcontractor. A subcontractor who prevails in a civil action to collect interest penalties from a prime contractor must be awarded its costs and disbursements, including attorney's fees, incurred in bringing the action.

HIST: 1985 c 136 s 5; 1995 c 31 s 1

MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS

THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Highway and Heavy

Region Number: 07

Counties within region:

- BLUE EARTH-07
- FARIBAULT-22
- LESUEUR-40
- NICOLLET-52
- SIBLEY-72
- WASECA-81

Effective: 2011-10-31

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Transportation
Office of Construction
Transportation Building MS650
John Ireland Blvd
St. Paul, MN 55155
(651) 366-4209

Refer questions concerning the prevailing wage rates to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
101 LABORER, COMMON (GENERAL LABOR WORK)	2011-10-31	23.66	14.13	37.79
	2012-05-01	23.66	14.38	38.04
102 LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2011-10-31	23.66	14.13	37.79
	2012-05-01	23.66	14.38	38.04
103 LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2011-10-31	13.30	0.00	13.30
104 FLAG PERSON	2011-10-31	23.66	14.13	37.79

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
	2012-05-01	23.66	14.38	38.04
105 WATCH PERSON	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
106 BLASTER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
107 PIPELAYER (WATER, SEWER AND GAS)	2011-10-31	25.66	14.13	39.79
	2012-05-01	25.66	14.38	40.04
108 TUNNEL MINER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
109 UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2011-10-31	24.36	14.13	38.49
	2012-05-01	24.36	14.38	38.74
110 SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2011-10-31	27.00	14.32	41.32
111 TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
112 QUALITY CONTROL TESTER (FIELD AND COVERED OFF-SITE FACILITIES; TESTING OF AGGREGATE, ASPHALT, AND CONCRETE MATERIALS); LIMITED TO MN DOT HIGHWAY AND HEAVY CONSTRUCTION PROJECTS WHERE THE MN DOT HAS RETAINED QUALITY ASSURANCE PROFESSIONALS TO REVIEW AND INTERPRET THE RESULTS OF QUALITY CONTROL TESTERS. SERVICES PROVIDED BY THE CONTRACTOR.	2011-10-31	17.49	4.18	21.67
201 ARTICULATED HAULER	2011-10-31	28.61	16.60	45.21
	2012-05-01	28.66	16.70	45.36
202 BOOM TRUCK	2011-10-31	28.61	16.60	45.21
	2012-05-01	28.66	16.70	45.36
203 LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS	2011-10-31	19.50	0.00	19.50
204 OFF-ROAD TRUCK	2011-10-31	28.61	16.60	45.21
	2012-05-01	28.66	16.70	45.36
GROUP 2	2011-10-31	29.36	16.60	45.96

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
	2012-05-01	29.41	16.70	46.11

302 HELICOPTER PILOT (HIGHWAY AND HEAVY ONLY)

303 CONCRETE PUMP (HIGHWAY AND HEAVY ONLY)

304 ALL CRANES WITH OVER 135-FOOT BOOM, EXCLUDING JIB (HIGHWAY AND HEAVY ONLY)

305 DRAGLINE, CRAWLER, HYDRAULIC BACKHOE (TRACK OR WHEEL MOUNTED) AND/OR OTHER SIMILAR EQUIPMENT WITH SHOVEL-TYPE CONTROLS THREE CUBIC YARDS AND OVER MANUFACTURER.S RATED CAPACITY INCLUDING ALL ATTACHMENTS. (HIGHWAY AND HEAVY ONLY)

306 GRADER OR MOTOR PATROL

307 PILE DRIVING (HIGHWAY AND HEAVY ONLY)

308 TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)

GROUP 3	2011-10-31	28.91	16.60	45.51
	2012-05-01	28.96	16.70	45.66

309 ASPHALT BITUMINOUS STABILIZER PLANT

310 CABLEWAY

311 CONCRETE MIXER, STATIONARY PLANT (HIGHWAY AND HEAVY ONLY)

312 DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)

313 DRAGLINE, CRAWLER, HYDRAULIC BACKHOE (TRACK OR WHEEL MOUNTED) AND/OR SIMILAR EQUIPMENT WITH SHOVEL-TYPE CONTROLS, UP TO THREE CUBIC YARDS MANUFACTURER.S RATED CAPACITY INCLUDING ALL ATTACHMENTS (HIGHWAY AND HEAVY ONLY)

314 DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER

315 FRONT END LOADER, FIVE CUBIC YARDS AND OVER INCLUDING ATTACHMENTS. (HIGHWAY AND HEAVY ONLY)

316 LOCOMOTIVE CRANE OPERATOR

317 MIXER (PAVING) CONCRETE PAVING, ROAD MOLE, INCLUDING MUCKING OPERATIONS, CONWAY OR SIMILAR TYPE

318 MECHANIC . WELDER ON POWER EQUIPMENT (HIGHWAY AND HEAVY ONLY)

319 TRACTOR . BOOM TYPE (HIGHWAY AND HEAVY ONLY)

320 TANDEM SCRAPER

321 TRUCK CRANE . CRAWLER CRANE (HIGHWAY AND HEAVY ONLY)

322 TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)

GROUP 4	2011-10-31	28.61	16.60	45.21
	2012-05-01	28.66	16.70	45.36

323 AIR TRACK ROCK DRILL

324 AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)

325 BACKFILLER OPERATOR

326 CONCRETE BATCH PLANT OPERATOR (HIGHWAY AND HEAVY ONLY)

327 BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)

328 BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)

329 BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS

330 CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS

331 CHIP HARVESTER AND TREE CUTTER

332 CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE

333 CONCRETE MIXER ON JOBSITE (HIGHWAY AND HEAVY ONLY)

334 CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)

335 CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT

336 CURB MACHINE

337 DIRECTIONAL BORING MACHINE

338 DOPE MACHINE (PIPELINE)

339 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL (HIGHWAY AND HEAVY ONLY)

340 DUAL TRACTOR

341 ELEVATING GRADER

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
342 FORK LIFT OR STRADDLE CARRIER (HIGHWAY AND HEAVY ONLY)				
343 FORK LIFT OR LUMBER STACKER (HIGHWAY AND HEAVY ONLY)				
344 FRONT END, SKID STEER OVER 1 TO 5 C YD				
345 GPS REMOTE OPERATING OF EQUIPMENT				
346 HOIST ENGINEER (POWER) (HIGHWAY AND HEAVY ONLY)				
347 HYDRAULIC TREE PLANTER				
348 LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)				
349 LOCOMOTIVE (HIGHWAY AND HEAVY ONLY)				
350 MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE				
351 MULTIPLE MACHINES, SUCH AS AIR COMPRESSORS, WELDING MACHINES, GENERATORS, PUMPS (HIGHWAY AND HEAVY ONLY)				
352 PAVEMENT BREAKER OR TAMPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE				
353 PICKUP SWEEPER, ONE CUBIC YARD AND OVER HOPPER CAPACITY(HIGHWAY AND HEAVY ONLY)				
354 PIPELINE WRAPPING, CLEANING OR BENDING MACHINE				
355 POWER PLANT ENGINEER, 100 KWH AND OVER (HIGHWAY AND HEAVY ONLY)				
356 POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES				
357 PUGMILL				
358 PUMPCRETE (HIGHWAY AND HEAVY ONLY)				
359 RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)				
360 SCRAPER				
361 SELF-PROPELLED SOIL STABILIZER				
362 SLIP FORM (POWER DRIVEN) (PAVING)				
363 TIE TAMPER AND BALLAST MACHINE				
364 TRACTOR, BULLDOZER (HIGHWAY AND HEAVY ONLY)				
365 TRACTOR, WHEEL TYPE, OVER 50 H.P. WITH PTO UNRELATED TO LANDSCAPING (HIGHWAY AND HEAVY ONLY)				
366 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER (HIGHWAY AND HEAVY ONLY)				
367 TUB GRINDER, MORBARK, OR SIMILAR TYPE				
368 WELL POINT DISMANTLING OR INSTALLATION (HIGHWAY AND HEAVY ONLY)				
GROUP 5	2011-10-31	26.04	16.60	42.64
	2012-05-01	26.09	16.70	42.79
369 AIR COMPRESSOR, 600 CFM OR OVER (HIGHWAY AND HEAVY ONLY)				
370 BITUMINOUS ROLLER (UNDER EIGHT TONS)				
371 CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)				
372 FORM TRENCH DIGGER (POWER)				
373 FRONT END, SKID STEER UP TO 1C YD				
374 GUNITE GUNALL (HIGHWAY AND HEAVY ONLY)				
375 HYDRAULIC LOG SPLITTER				
376 LOADER (BARBER GREENE OR SIMILAR TYPE)				
377 POST HOLE DRIVING MACHINE/POST HOLE AUGER				
378 POWER ACTUATED AUGER AND BORING MACHINE				
379 POWER ACTUATED JACK				
380 PUMP (HIGHWAY AND HEAVY ONLY)				
381 SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)				
382 SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER				
383 SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER				
384 STUMP CHIPPER AND TREE CHIPPER				
385 TREE FARMER (MACHINE)				
GROUP 6	2011-10-31	25.17	16.60	41.77
	2012-05-01	25.22	16.70	41.92
387 CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE

388 CONVEYOR (HIGHWAY AND HEAVY ONLY)

389 DREDGE DECK HAND

390 FIRE PERSON OR TANK CAR HEATER (HIGHWAY AND HEAVY ONLY)

391 GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)

392 GREASER (TRACTOR) (HIGHWAY AND HEAVY ONLY)

393 LEVER PERSON

394 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS, AND MILLING MACHINES, OR OTHER SIMILAR HEAVY EQUIPMENT) (HIGHWAY AND HEAVY ONLY)

395 POWER SWEEPER

396 SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS

397 TRACTOR, WHEEL TYPE, OVER 50 H.P., UNRELATED TO LANDSCAPING

GROUP 1 — FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US

501 HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)

502 TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)

503 TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

GROUP 2 — FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US

504 CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)

505 PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)

506 TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)

507 TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

GROUP 3 — FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US

508 ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)

509 CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)

510 DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)

511 STATIONARY TOWER CRANE 200 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)

512 SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)

513 TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)

514 TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

GROUP 4 — FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US

515 CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)

516 FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

517 HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)

518 LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)

519 OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)

520 TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)

GROUP 5 — FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US

521 AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)

522 CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)

523 CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM

524 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION (COMMERCIAL CONSTRUCTION ONLY)

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
525 FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)				
526 FRONT END, SKID STEER 1 C YD AND OVER				
527 HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)				
528 MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)				
529 POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)				
530 PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				
531 SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
532 STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)				
533 TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)				
534 WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 6	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
535 CONCRETE BATCH PLANT (COMMERCIAL CONSTRUCTION ONLY)				
536 FIREPERSON, FIRST CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
537 FRONT END, SKID STEER UP TO 1 C YD				
538 GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)				
539 TRACTOR OPERATOR D2 OR SIMILAR SIZE (COMMERCIAL CONSTRUCTION ONLY)				
540 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER				
GROUP 7	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
541 AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)				
542 BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)				
543 CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)				
544 FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
545 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)				
546 PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)				
547 PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 8	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
548 ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY)				
549 GREASER (COMMERCIAL CONSTRUCTION ONLY)				
550 MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 1	2011-10-31	18.30	7.55	25.85
601 MECHANIC . WELDER				
602 TRACTOR TRAILER DRIVER				
603 TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				
GROUP 2	2011-10-31	20.24	0.63	20.87
604 FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3	2011-10-31	20.11	13.25	33.36
	2012-05-01	20.51	13.25	33.76
605 BITUMINOUS DISTRIBUTOR DRIVER				
606 BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607 THREE AXLE UNITS				
GROUP 4	2011-10-31	20.11	13.25	33.36

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
	2012-05-01	20.51	13.25	33.76
608 BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609 DUMP PERSON				
610 GREASER				
611 PILOT CAR DRIVER				
612 RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613 TWO AXLE UNIT				
614 SLURRY OPERATOR				
615 TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616 TRACTOR OPERATOR, UNDER 50 H.P.				
701 HEATING AND FROST INSULATORS	2011-10-31	18.00	1.23	19.23
702 BOILERMAKERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
703 BRICKLAYERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
704 CARPENTERS	2011-10-31	23.06	15.83	38.89
	2012-05-01	23.56	15.83	39.39
705 CARPET LAYERS (LINOLEUM)	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
706 CEMENT MASONS	2011-10-31	30.95	15.74	46.69
707 ELECTRICIANS	2011-10-31	31.08	15.59	46.67
708 ELEVATOR CONSTRUCTORS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
709 GLAZIERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
710 LATHERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
711 GROUND PERSON	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
712 IRONWORKERS	2011-10-31	34.05	20.37	54.42
713 LINEMAN	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
714 MILLWRIGHT	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
715 PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2011-10-31	29.70	14.06	43.76
716 PILEDRIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2011-10-31	26.36	17.26	43.62
	2012-05-01	26.86	17.26	44.12

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
717 PIPEFITTERS . STEAMFITTERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
718 PLASTERERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
719 PLUMBERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
720 ROOFER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
721 SHEET METAL WORKERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
722 SPRINKLER FITTERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
723 TERRAZZO WORKERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
724 TILE SETTERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
725 TILE FINISHERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
726 DRYWALL TAPER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
727 WIRING SYSTEM TECHNICIAN	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
728 WIRING SYSTEMS INSTALLER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
729 ASBESTOS ABATEMENT WORKER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
730 SIGN ERECTOR	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			

DEPARTMENT OF LABOR AND INDUSTRY **April 4, 2011**
LABOR STANDARDS UNIT

NOTICE OF CERTIFICATION OF TRUCK RENTAL RATES AND EFFECTIVE DATE PURSUANT TO MINNESOTA RULES, PART 5200.1105

On April 4, 2011, the Commissioner of the Department of Labor and Industry ("DLI") certified the minimum truck rental rates for highway projects in the state's ten highway and heavy construction areas for trucks and drivers operating "five or more axle units, straight body trucks," "four axle units, straight body trucks," "three axle units," "tractor only" and "tractor trailers." The certification followed publication of the Notice of Determination of Truck Rental Rates in the *State Register* on February 7, 2011 and the informal conference held pursuant to Minnesota Rules, part 5200.1105 on March 1, 2011.

According to Minnesota Rules, part 5200.1105, the purpose of the informal conference is for DLI to obtain further input regarding the proposed rates before the rates are certified. Approximately 50 individuals attended the informal conference. Many of the attendees voiced strong concerns regarding the inadequacy of the proposed rates. Among the concerns raised was the fact that the proposed rates were based on 2009 costs, including the 2009 price of fuel. Speakers indicated that because of the dramatic increase in the price of diesel in recent months, the published rates were far below the operators' current costs. As stated by one attendee:

> I might not even be able to survive until next year. If I have a bad season, there's no room left, you know. The price of oil and the price of fuel is going to kill all of us guys this summer.

Testimony of Mike McDonald, Transcript of Informal Conference, p. 63.

Following the informal conference, DLI staff obtained data from the United States Department of Energy ("DOE") regarding the price of diesel during 2009 as compared to current costs. That data, available at www.eia.doe.gov, show that the average price of diesel during 2009 was $2.463 per gallon. The average price of diesel during January and February 2011 was $3.497 per gallon. Consequently, the average price of diesel for the first two months of this year was 41.9% higher than the average cost of diesel during 2009.

The purpose of Minnesota Rules, part 5200.1105, as stated in its Statement of Need and Reasonableness, is to "provide equitable compensation" to independent truck operators. The commissioner finds that in order to carry out the purpose of the rule, it is appropriate to consider the concerns expressed at the informal conference[1] and to use average 2011 diesel costs in computing and certifying 2011 truck rental rates. Specifically, the commissioner finds that the extreme disparity between 2009 and current

[1] The DLI has historically used input from the informal conferences to establish certified rates. For example, truck rental rates certified in 2009 varied from the proposed rates based on information gathered at the informal conference.

fuel costs warrants this adjustment in order for truck operators to be equitably compensated. [2]

Construction truck operating costs were initially determined by survey on a statewide basis and were the subject of further input by interested parties attending the informal conference pursuant to Minnesota Rules, part 5200.1105 on March 1, 2011 and further data on fuel prices from the DOE for 2009 and 2011. In light of the discussion above, fuel costs stated in the surveys were adjusted upward by 41.9% to determine statewide operating costs. As a result of this adjustment, the operating cost for "five or more axle units, straight body trucks" is determined to be $49.10 per hour; the operating cost for "four axle units, straight body trucks" is determined to be $45.49 per hour; the operating cost for "three axle units" is determined to be $37.35 per hour; the operating cost for "tractor only" is determined to be $46.02 per hour; and the operating cost for "tractor trailers" is determined to be $57.48 per hour.

Adding the prevailing wage for drivers of these five types of trucks from each of the State's ten highway and heavy construction areas to the operating costs, the minimum hourly truck rental rate for the five types of trucks in each area is certified to be as follows:

	Tractor Trailer	Five or more axle	Four axle	Three Axle	Tractor only
Region 1	97.23	74.04	70.43	76.45	85.77
Region 2	90.90	82.01	78.40	67.41	79.44
Region 3	90.90	73.06	69.45	70.11	79.44
Region 4	81.03	72.65	69.04	70.11	69.57
Region 5	94.43	76.46	72.85	66.75	82.97
Region 6	77.48	79.23	75.62	67.15	66.02
Region 7	83.33	86.50	82.89	74.65	71.87
Region 8	84.99	76.46	72.85	70.11	73.53
Region 9	97.63	76.46	72.85	76.85	86.17
Region 10	90.90	82.01	78.40	70.11	79.44

[2] The commissioner notes that the Minnesota Department of Transportation incorporates a fuel adjustment clause in certain of its contracts to accommodate the fluctuating price of fuel. That clause generally provides for the adjustment of contract payments when the cost of fuel increases or decreases by more than 15% from an indexed rate during the term of the contract. By using 2011 fuel costs in certifying 2011 truck rental rates, the commissioner is not intending to adopt or establish a similar fuel adjustment mechanism. Rather, he is taking this action to effectuate the purpose of Part 5200.1105 in light of the concerns raised at the informal conference and the dramatic increase in the price of diesel between 2009 and effective date of 2011 truck rental rates.

The operating costs, including the average truck broker fees paid by those survey respondents who reported paying truck broker fees, and the truck rental rates may also be reviewed by accessing DLI's website at www.dli.mn.gov. Questions regarding the operational costs and truck rental rates can be answered by calling (651) 284-5091.

The minimum truck rental rates certified for these five types of trucks in the state's ten highway and heavy construction areas will be effective for all highway and heavy construction projects financed in whole or part with state funds advertised for bid on or after April 4, 2011.

KEN B. PETERSON
COMMISSIONER

INDEX--SP2005BOOK

SPECIAL PROVISIONS
DIVISION A
SPECIAL REQUIREMENTS

S-1 INTENT OF CONTRACT

This Contract consists of grading, aggregate base, bituminous paving, and drainage on the following:

CSAH	60	-	SAP 07-660-05
CSAH	82	-	SAP 07-682-08
Victory Drive		-	CP 7829

Each road shall be considered individually on the schedule of prices in the proposal but only the grand total of all the roads combined will be considered in awarding the contract. Bids not including all projects will not be accepted.

GOVERNING SPECIFICATIONS
The State of Minnesota, Department of Transportation "Standard Specifications for Construction" 2005 EDITION shall apply in this contract, except as modified or altered in the following Special Provisions.

DIVISION S
SPECIAL REQUIREMENTS

S-2 CONTACT INFORMATION

SP2005-3

Questions regarding this Project, including any questions prior to bidding, shall be directed to The Blue Earth County Engineering Department at 507-304-4025.

S-3 USE OF ADHESIVE ANCHORS

SP2005-5.1

The use of adhesive anchors in sustained tension is prohibited. Other application utilizing adhesive anchors, such as metal rail attachment, in a non-direct tensile application is permitted.

S-4 PERMITS

Blue Earth County has applied for a WCA Permit to place fill in wetland areas. The Permit is expected to be received prior to bid opening. Until that time no fill may be placed in wetlands until the permit is received.

S-5 (1103) DEFINITIONS

SP2005-6

The provisions of MnDOT 1103 are supplemented and/or modified with the following:

S-5.1 The definition for SPECIMEN TREE is revised to read as follows:

A notable and valued tree in consideration of species, size, condition, age, longevity, durability, crown development, function, visual quality, and public or private prominence or benefit as indicated in the Contract documents or as determined by the Engineer.

S-6 (1206) PREPARATION OF PROPOSAL

SP2005-7

The provisions of MnDOT 1206 are supplemented and/or modified with the following:

S-6.1 The first paragraph of MnDOT 1206.2 is hereby changed to read:

The bidder's attention is directed to MN Statute § 161.32 subd. 1c, which provides among other things, that a bid will be rejected if it contains any alterations or erasures that are not corrected as follows:

S-7 (1208) PROPOSAL GUARANTY - MODIFIED

S-7.1 No proposal will be considered unless it is accompanied by a guaranty complying with the requirements of Specification 1208 and providing a penal sum at least equal to 5 percent of the total amount of the bid (under all circumstances and without exception) as provided in Specification 1208.

S-8 (1210) WITHDRAWAL OR REVISION OF PROPOSALS

SP2005-8.1

The provisions of MnDOT 1210 are hereby deleted and replaced with the following:

S-8.1 Any bidder may withdraw or revise its Proposal after it has been deposited with the Contracting Authority, provided the request for withdrawal or revision is received in writing before the time set for opening proposals.

S-8.2 The Department reserves the right to revise the Plans, Specifications, Special Provisions, and Proposal form for any Project at any time prior to the date set for opening the Proposals. Revisions will be made by Addendum, duly numbered and dated, subject to the following provisions:

(1) Each Addendum will be Posted to the Blue Earth County Egram Website at https://egram.co.blue-earth.mn.us and may also be delivered by certified mail, courier service, fax, or other electronic transmission to each prospective bidder who has received a Proposal form prior to the date of Addendum. The Addendum will be included with all Proposal forms issued to bidders after the date of the Addendum.

(2) If revisions made by an Addendum require considerable change or reconsideration on the part of the bidder, the date set for opening the Proposals may be postponed, in which case the Addendum will include an announcement of the new date set for opening Proposals.

(3) Each bidder shall acknowledge receipt of each Addendum, either in the space provided on the Proposal form or by submitting a letter prior to the time set for opening Proposals.

S-9 (1212) PUBLIC OPENING OF PROPOSALS

SP2005-8.2

The provisions of MnDOT 1212 are hereby deleted and replaced with the following:

Proposals will be opened at the time indicated in the Advertisement for Bids.

S-10 (1305) REQUIREMENT OF CONTRACT BOND

SP2005-10

The provisions of MnDOT 1305 are hereby deleted and replaced with the following:

S-10.1 The successful bidder shall furnish a payment bond equal to the Contract amount and a performance bond equal to the Contract amount as required by Minnesota Statutes, section 574.26. The surety and form of the bonds shall be subject to the approval of the contracting authority.

S-10.2 The contracting authority shall require for all contracts less than or equal to five million dollars ($5,000,000.00), that the aggregate liability of the payment and performance bonds shall be twice the amount of the

contract. All contracts in excess of five million dollars ($5,000,000.00) shall have an aggregate liability equal to the amount of the contract.

S-11 (1306) EXECUTION AND APPROVAL OF CONTRACT

SP2005-11

The provisions of MnDOT 1306 are modified to the extent the Contract shall be signed, and the Contract Bond delivered, in the offices of the County Engineer at Mankato, Minnesota within three (3) days, excluding Saturdays, Sundays and holidays, after the bidder has been advised that his/her bid has been accepted subject to execution and approval of the Contract as required by law, and that notification thereof has been made by letter.

S-12 (1404) MAINTENANCE OF TRAFFIC, (1707)PUBLIC SAFETY, AND (2563) TRAFFIC CONTROL - MODIFIED

The provisions of 1404 are supplemented as follows:

S-12.1 The Contractor shall furnish, install, maintain, and remove all traffic control devices required to provide safe movement of vehicular and/or pedestrian traffic passing through the work zone during the life of the Contract from the start of Contract operations to the final completion thereof. The Engineer will have the right to modify the requirements for traffic control as deemed necessary due to existing field conditions.

S-12.2 Traffic control devices include, but are not limited to, barricades, warning signs, trailers, flashers, cones, drums, pavement markings and flaggers as required and sufficient barricade weights to maintain barricade stability.

S-12.3 The Contractor shall furnish names, addresses, and phone numbers of at least three (3) individuals responsible for the placement and maintenance of traffic control devices. At least one of these individuals shall be "on call" 24 hours per day, seven days per week during the times any traffic control devices, furnished and installed by the Contractor, are in place. The required information shall be submitted to the Engineer at the Pre-construction Conference. The Contractor shall also furnish the names, addresses, and phone numbers of those individuals to the following:

1.	Local Agency Highway/Public Works Department		(507) 304-4025
2.	Local County/City Sheriff's/Police Department		(507) 304-4800
3.	Local Fire Department	911	
4.	City of Mankato Engineer		(507) 387-8634

S-12.4 The Contractor shall, at the pre-construction conference, designate a Work Zone Safety Coordinator who shall be responsible for safety and traffic control management in the Project work zone. The Work Zone Safety Coordinator shall be either an employee of the Contractor such as a superintendent or a foreman, or an employee of a firm which has a subcontract for overall work zone safety and traffic control management for the Project. The responsibilities of the Work Zone Safety Coordinator shall include, but not be limited to:

- Coordinating all work zone traffic control operations of the Project, including those of the Contractor, subcontractors and suppliers.
- Establishing contact with local school district, government, law enforcement, and emergency response agencies affected by construction before work begins.
- Maintaining a record of all known crashes within a work zone. This record should include all available information, such as: time of day, probable cause, location, pictures, sketches, weather conditions, interferences to traffic, etc. These records shall be made available to the Engineer upon request.

S-12.5 The Contractor shall inspect, on a daily basis, all traffic control devices, which the Contractor has furnished and installed, and verify that the devices are placed in accordance with the Traffic Control Layouts, these Special Provisions, and/or the MN MUTCD. Any discrepancy between the placement and the required placement shall be immediately corrected. The person performing the inspection shall be required to make a daily log. This log shall also include the date and time any changes in the stages, phases, or portions thereof go into effect. The log shall identify the location and verify that the devices are placed as directed or corrected in accordance with the Plan. All entries in the log shall include the date and time of the entry and be signed by the person making the inspection. The Engineer reserves the right to request copies of the logs as he deems necessary.

S-12.6 Measurement and Payment:
Traffic Control will be measured and paid for as follows:

Payment for furnishing, installing, maintaining, relocating and subsequently removing traffic control devices (including flagpersons) as required will be made as a lump sum under Item 2563.601 (Traffic Control) and according to the following schedule:

(1) When 5 percent of the Contract amount is earned, 50 percent of the amount bid for traffic control will be paid.
(2) When 10 percent, or more, of the Contract amount is earned, an additional 25 percent of the amount bid for traffic control will be paid.
(3) When 50 percent, or more, of the Contract amount is earned, an additional 20 percent of the amount bid for traffic control will be paid.
(4) The remaining 5 percent bid for traffic control will be paid when all work has been completed and accepted.
(5) In all items above, the original Contract amount shall be the total value of all Contract Items including the traffic control item, but the percentage earned in each case shall be exclusive of the traffic control item.

S-12.7 VEHICLE WARNING LIGHT SPECIFICATION
All Contractors', subcontractors' and suppliers' mobile equipment, operating within the limits of the Project with potential exposure to passing traffic, shall be equipped with operable warning lights which meet the appropriate requirements of the SAE specifications. This would include closed roads that are open to local traffic only. This also includes any vehicle which enters the traveled roadway at any time. The SAE specification requirements are as follows:

360 Degree Rotating Lights - SAE Specification J845

Flashing Lights - SAE Specification J595

Flashing Strobe Lights - SAE Specification J1318

Lights shall be mounted so that at least one light is visible at all times when at eye level from a 18 m [60 foot] radius about the equipment. In order to meet the 360 degree at 18 m [60 foot] radius requirements supplemental lighting may be used in addition to the lights on the Approved Products List. All supplemental lights must be SAE Class 1 certified. This specification is to be used for both day and night time operations. All costs incurred to provide warning lights shall be at no cost to the Department. These warning lights shall also be operating and visible when a vehicle decelerates to enter a construction work zone and again when a vehicle leaves the work zone and enters the traveled traffic lane.

Contractor shall equip their vehicles with lights that are on the Approved Products List which can be found at: http://www.dot.state.mn.us/products/workzone/vehiclelights.html .

S-12.8 The Contractor shall provide two (2) extra Type 1 Barricades on site.

S-12.9 In areas of milling, bituminous overlays, or low shoulders the Contractor Shall provide "Grooved Pavement" and/or "Bump" signs with an Advisory Speed: in accordance with the MMUTCD Manual and as directed by the Engineer.

S-13 (1506) SUPERVISION BY CONTRACTOR

SP2005-15

The provisions of MnDOT 1506 are supplemented as follows:

At the Preconstruction Conference the Contractor shall designate in writing who the competent superintendent and competent individual (if different) will be for this Project. These persons can only be changed throughout the duration of the Project by submission of written authorization to the Engineer by the Contractor. The submittal of these persons shall be done before any work is performed on this Project.

The Contractor will be subject to an hourly charge for failure to comply with the requirements of MnDOT 1506. Non-Compliance charges, for each incident, will be assessed at a rate of $100 per hour, for each hour or portion thereof, during which the Engineer determines that the Contractor has not complied. No charge will be made if the deficiency is corrected within one (1) hour of notification.

An incident of Non-Compliance will be defined as the receipt of a written work order by the Contractor with instructions to correct a deficiency.

S-14 (1507) UTILITY PROPERTY AND SERVICE

SP2005-16

Construction operations in the proximity of utility properties shall be performed in accordance with the provisions of MnDOT 1507, except as modified below:

S-14.1 The provisions of MnDOT 1507.1 B are hereby deleted and the following substituted therefore:

B Gopher State One Call
The Contractor shall:

(1) Mark the proposed excavation in accordance with the Minnesota State Statute 216D color code before contacting "Gopher State One Call." The Contractor shall mark proposed excavation area with white paint and white flags or in lieu of white flags, white stakes may be used. The Contractor must adhere to all requirements of Gopher State One Call in addition to the following:

The white markings must delineate the actual excavation area where the locating of underground facilities is required. All flags and stakes shall display the name, and phone number of the Contractor. All areas of proposed excavation shall be considered "practical" for the use of white markings, pursuant to Minnesota Statutes §216D.05 (2).

(2) Call "Gopher State One Call" at least 48 hours (excluding Saturdays, Sundays, and holidays) before starting excavation operations.

(3) The Contractor shall acquire a Positive Response confirmation from MnDOT for all proposed excavations when the Gopher State One Call has indicated MnDOT utilities may be affected. The Contractor may call MnDOT Electrical Services Section (ESS) Dispatch Locating to confirm the status of Utility infrastructure owned by MnDOT. MnDOT Electrical Services Section (ESS) Dispatch Locating can be contacted at the following phone numbers; (651) 366 -5750 or (651) 366-5751. The Contractor shall be responsible for all damage to MnDOT owned Utility infrastructure if a Positive Response confirmation has not been acquired from MnDOT. The Contractor is required to comply with the provisions of Minnesota Statutes chapter 216D when performing Excavation as

defined in Minnesota Statutes §216D.01 (subdivision 5), and will be responsible for damages to facilities in accordance with Minnesota Statutes §216D.06.

S-14.2 If the Contractor is negligent in adhering to MnDOT 1507.1 B, he will be subject to a daily charge assessed at a rate of $500.00 per excavation area per day for each day or any portion thereof with which the Engineer determines that the Contractor has not complied.

S-14.3 All utilities that relate to this Project are classified as "Level D," unless the Plans specifically state otherwise. This utility quality level was determined according to the guidelines of CI/ASCE 38-02, entitled "Standard Guidelines for the Collection and depiction of existing subsurface utility data."

S-14.4 By bidding on this Contract, the bidder agrees that it shall use the Plan to identify the location of drainage facilities as satisfying the requirements of Minnesota Statutes Ch. 216D and Minnesota Rules 7560.0250 with respect to MnDOT's storm water drainage facilities.

S-14.5 The following utility owners have existing facilities that may be affected by the work under this Contract, all of which they intend where necessary to relocate or adjust in advance of or concurrently with the Contractor's operations.

BENCO ELECTRIC	507-387-7963
XCEL ENERGY	507-387-9683
HICKORY TECH	507-387-1843
CHARTER COMMUNICATIONS	507-469-0256
CENTERPOINT ENERGY	621-321-5444

See http://www.dot.state.mn.us/utility for utility operators contact list.

S-14.6 The City of Mankato utilities that are affected such as storm sewer, sanitary sewer, and water supply have been included in the Plan for adjustment or relocation. The Contractor shall notify the City Engineer at telephone 507-387-8634, in advance of the date he intends to start work and he shall furnish that office with such information as may be necessary to permit the responsible authorities to make suitable arrangements relative thereto.

S-14.7 The State's Contractor shall coordinate his/her work and cooperate with the foregoing utility owners and their forces in a manner consistent with the provisions of MnDOT 1507 and the applicable provisions of MnDOT 1505.

S-15 (1508) CONSTRUCTION STAKES, LINES AND GRADES - MODIFIED

SP2005-17

The provisions of MnDOT 1508 are hereby modified and supplemented as follows:

The Contractor shall give the Engineer 48-hour notice of request for construction stakes.

S-16 (1513) RESTRICTIONS ON MOVEMENT AND STORAGE OF HEAVY LOADS AND EQUIPMENT

SP2005-21.1

The provisions of MnDOT 1513 are hereby deleted and replaced with the following:

The hauling or storage of materials and/or the movement and storage of equipment to and from the Project and over completed structures, base courses, and pavements within the Project that are open for use by traffic and are to remain a part of the permanent improvement, shall comply with the regulations governing the operation of vehicles on the highways of Minnesota, as prescribed in the Highway Traffic Regulation Act.

The Contractor shall comply with legal load restrictions, and with any special restrictions imposed by the Contract, in hauling or storing materials, moving or storing equipment on structures, completed subgrades, base courses, and pavements within the Project that are under construction, or have been completed but have not been accepted and opened for use by traffic.

The Contractor shall have a completed Weight Information Card in each vehicle used for hauling bituminous mixture, aggregate, batch concrete, and grading material (including borrow and excess) prior to starting work. This card shall identify the truck or tractor and trailer by Minnesota or prorated license number and shall contain the tare, maximum allowable legal gross mass, supporting information, and the signature of the owner. The card shall be available to the Engineer upon request. All Contractor-related costs in providing, verifying, and spot checking the cab card information (including weighing trucks on certified commercial scales, both empty and loaded) will be incidental, and no compensation other than for Plan pay items will be made.

Equipment mounted on crawler tracks or steel-tired wheels shall not be operated on or across concrete or bituminous surfaces without specific authorization from the Engineer. Special restrictions may be imposed by the Contract with respect to speed, load distribution, surface protection, and other precautions considered necessary.

Should construction operations necessitate the crossing of an existing pavement, bridges or completed portions of the pavement structure with equipment or loads that would otherwise be prohibited, approved methods of load distribution or bridging shall be provided by the Contractor at no expense to the Department.

Neither by issuance of a special permit, nor by adherence to any other restrictions imposed, shall the Contractor be relieved of liability for damages resulting from the operation and movement of construction equipment.

Unless specifically allowed in the Contract, or approved by the Engineer, all construction material and/or equipment which might be temporarily stored or parked on a bridge deck while the bridge is under construction will be limited by this specification. These requirements are intended to limit construction loads to levels commensurate with the typical design live load. The storage of materials and equipment as a whole will be limited to all of the following:

- Stockpiles of material are limited to a maximum weight of 31,702 kg/100 m^2 (65,000 lbs./1000 ft^2).
- Individual material stockpiles (including but not limited to pallets of products, reinforcing bar bundles, aggregate piles) are limited to a maximum weight of 12,200 kg/10 m^2 (25,000 lbs./100 ft^2).
- Combinations of vehicles, materials, and other equipment are limited to a maximum weight of 90,700 kg (200,000 lbs.) per span providing span lengths are over 40 feet long.

The Contractor may submit alternate loadings to the Project Engineer 30 Calendar days prior to placement. Any submittals will require the calculations be certified by a Professional Engineer.

S-17 (1514) MAINTENANCE DURING CONSTRUCTION

SP2005-22

The provisions of MnDOT 1514 are supplemented with the following:

In addition to the Contractor's requirements for sweeping as required under MnDOT 2051 (Maintenance and Restoration of Haul Roads), the Engineer may require additional sweeping of roads adjacent to the construction site to provide safe conditions for the traveling public, environmental reasons, local regulatory requirements or as otherwise directed by the Engineer.

Payment for additional sweeping ordered by the Engineer will be made as specified below. (This price represents a shared cost.)

Pick Up Broom W/Operator .....$55.00 per hour

Self Propelled Pavement Broom W/Operator .....$30.00 per hour

S-18 (1517) CLAIMS FOR COMPENSATION ADJUSTMENT

SP2005-23

The provisions of MnDOT 1517 are hereby supplemented with the following:

S-18.1 NOTICE OF CLAIM:

At the time the Contractor gives written notice of the claim, the Contractor and the Department shall immediately begin to keep and maintain complete and specific records to the extent possible. The records shall consist of, but are not limited to, cost and schedule records concerning the details of the perceived claim.

Unless otherwise agreed to in writing, the Contractor shall continue with and carry on the work and progress during the pendency of any claim, dispute, decision or determination by the Engineer, and any arbitration proceedings.

S-18.2 SUBMISSION OF CLAIMS:

The Contractor shall submit the claim to the Engineer no later than 60 Calendar Days after receiving written notice from the Engineer that direct damages (money or time due) resulting from the claim has occurred in the opinion of the Engineer. If, in the opinion of the Contractor, the direct damages have not fully occurred, the Contractor shall provide written justification detailing why the direct damages have not fully occurred. This written justification shall be submitted to the Engineer no later than 30 Calendar Days from receiving the notice from the Engineer. If proper justification is not given as required within the 30 Calendar Day requirement or the claim is not submitted to the Engineer within 60 Calendar Days after receiving notice from the Engineer that the direct damages have occurred, the Contractor waives all claims for additional compensation in connection with the work already performed.

The contents of the claim shall be in accordance with MnDOT 1517 and shall also include all scheduling documentation related to the claim

The Engineer shall have access to the Contractors records involved in the claim and, when so requested, shall furnish the Engineer copies of claim documentation.

The Contractor shall promptly furnish any clarification and additional information or data requested in writing by the Engineer.

All claims shall be submitted through the Contractor. Submission of claims directly from subcontractors shall constitute a waiver of that portion of the claim.

S-18.3 DECISION ON CLAIMS:

The Department intends to resolve claims at the lowest possible administrative level. Upon receipt of the claim, the Engineer will make a written decision in relation to any claim presented by the Contractor within the following time frames:

(A) For an adjustment in compensation, or other contractual dispute between the parties where the amount in controversy is $75,000.00 or less, 60 Calendar Days from the receipt of the Contractor's claim;

(B) For an adjustment in compensation, or other contractual dispute between the parties where the amount in controversy is more than $75,000.00, 90 Calendar Days from the receipt of the Contractor's claim.

Unless the Contractor and the Engineer otherwise stipulate in writing to a later time, if the Engineer does not make a decision or determination within these time frames, the claim shall be deemed denied.

When the Contract has established a dispute resolution process, that moves the dispute through various levels of both organizations, this process shall also be completed within the above time period.

S-18.4 MEDIATION

Notwithstanding the formal claims procedures set forth in this Special Provision, the parties may at any time enter into nonbinding mediation by mutual agreement. If the parties agree to mediation, then the time requirements set forth above in Section S-18.3 (A) and (B) are suspended until the mediation is completed. The time and place for mediation, as well as selection of the mediator, shall be established by mutual agreement. The mediator's costs shall be divided equally between the Contractor and the Department. This payment shall be accomplished by the Contractor paying in full all costs and fees for the mediator and then submit the bill to the Engineer for 50 percent reimbursement. Either party may terminate mediation at any time.

S-18.5 RIGHTS OF ARBITRATION:

The decision of the Engineer in relation to the Contractor's claim shall be deemed final unless the Contractor commences a legal action within the time prescribed by law or unless the Contractor invokes arbitration as prescribed hereafter in these Special Provisions. Nothing herein contained shall be so construed as to preclude the Contractor from commencing a legal action in relation to claims for a single issue in excess of $75,000.00 but the Contractor's sole legal remedy in relation to claims of $75,000.00 or less shall be arbitration as prescribed hereafter in these Special Provisions. If the claim amount is in excess of $75,000, the Contractor and MnDOT may mutually agree to arbitration.

If the Contractor seeks to arbitrate a claim of $75,000 or less, the Contractor shall submit a written request for arbitration to the Department's Claims Engineer in MnDOT's Central Office within 30 Calendar Days after the Contractor's receipt of the Engineer's decision. Failure to reasonably conform with this time requirement waives the right to arbitration. The scope of the arbitration proceeding shall be limited to the claim(s) that the Contractor previously presented to the Engineer for decision

S-18.6 ARBITRATION OF CLAIMS AND DISPUTES:

(A) For purposes of this section, a claim for adjustment in compensation shall mean an aggregate of operative facts which give rise to the rights which the Contractor seeks to enforce. Stated another way, a claim is the event, transaction, or set of facts that give rise to a claim for compensation. Any Contractor having a claim in excess of $75,000.00 may waive or abandon the dollar amount in excess of $75,000.00 so as to bring the claim within the scope of this section. However, the arbitration award shall not exceed $75,000.00. Various damages claimed by the Contractor for a single claim may not be divided into separate proceedings to create claims within the $75,000.00 limit.

(B) More than one separate claim may be presented at each arbitration hearing if agreed to by the Department, the Contractor, and the Arbitrator.

(C) Selection of the Arbitrator/ Optional Use of the American Arbitration Association:

a. Selection of the arbitrator shall be conducted by one representative of the Department and one representative of the Contractor. A single person shall represent the prime and all subcontractors involved in the claim. Separate representation for subcontractors during the selection of the arbitrator is not allowed.

b. The parties may mutually agree to have the arbitration process administered by the American Arbitration Association ("AAA").

c. The arbitration shall be administered by a single arbitrator.

d. The parties shall select an arbitrator by mutual agreement, or, if the parties have agreed to use the AAA to administer the process, shall select an arbitrator from a list of arbitrators provided by the Association in accordance with the Association's procedures.

(D) Arbitration Proceedings and Decision

a. All arbitration of claims shall be conducted in Minneapolis, Minnesota, or another mutually agreed upon location.

b. Regardless of whether the parties have agreed to use AAA to administer the process, the arbitration proceeding shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect and in accordance with the requirements below. The arbitration procedures set-forth in this Special Provision shall take precedence over conflicting American Arbitration Association requirements.

c. If mutually agreed to by both parties, the arbitration proceeding shall follow the Fast Track rules of the American Arbitration Association.

d. Unless otherwise agreed to by the parties, the arbitration hearing shall be bifurcated into a liability phase and, if needed, a valuation phase. No evidence or testimony regarding the value of the claim shall be presented during the liability phase.

e. The Contractor shall first present evidence to support the claim. The Department will then present evidence supporting its defense. Witnesses shall submit to questions or examinations. The arbitrator has the discretion to vary this procedure and shall afford a full and equal opportunity to all parties to be heard. Exhibits, when offered by either party, may be received in evidence by the arbitrator.

f. The arbitrator shall entertain motions, including motions that dispose of all or part of a claim or that may expedite the proceedings.

g. There shall be no ex parte communication between any party and an arbitrator.

h. When satisfied that the presentation of the parties is complete, the arbitrator shall declare the liability phase of the arbitration hearing closed. The arbitrator shall then determine whether MnDOT is liable.

i. If the Department is found to be liable, the arbitration proceeding shall continue before the same arbitrator to resolve all damages issues. The proceedings for this portion of the arbitration shall follow the procedures outlined in Section S-18.6(D)e of this Special Provision.

j. Within three Calendar Days after the close of the damages portion of the hearing, each party shall submit to the arbitrator their last best offers. The arbitrator shall be limited to awarding only one of the two figures submitted. In no event shall a claim award in arbitration exceed $75,000.

k. The decision or award of the arbitrator shall be:

i. In writing showing the basis for the decision or award. The arbitrator shall use the Contract and Minnesota law, or, in the absence of Minnesota law on the issue(s), other persuasive authority, as the basis for the decision.

ii. Final and binding on both the Department and the Contractor.

The award shall have the same finality as is accorded awards under the Uniform Arbitration Act, Minnesota Statutes Chapter 572.

(E) Arbitration Costs

a. Each party to the arbitration shall bear its own costs and fees assessed by the American Arbitration Association or independent arbitrator which shall be divided equally between the parties to the arbitration. This payment will be accomplished by the Contractor paying in full all costs and fees for the arbitrator and then submit the bill to the Engineer for 50 percent reimbursement.

b. Each party shall bear its own preparation costs.

S-19 (1601) SOURCE OF SUPPLY AND QUALITY

SP2005-24

The provision of MnDOT 1601 are supplemented as follows:

S-19.1 The Contractor will furnish and use only steel and iron materials manufactured in the United States in executing the work under this Contract, in conformance with the provision of the U.S. Code of Federal Regulations 23CFR635.410. Domestic products taken out of the United States for any process (e.g. change of chemical content, permanent shape or size, or final finish of product) shall be considered foreign source materials.

S-19.2 All bids must be based on furnishing domestic iron and steel, which includes the application of the coating, except where the cost of iron and steel materials incorporated in the work does not exceed one-tenth of one percent of the total Contract cost or $2,500.00, whichever is greater. The state may approve the use of foreign iron and steel materials for particular Contract items, provided the bidder submits, a stipulation identifying the foreign source iron and/or steel product(s) and the estimated invoice cost of the product(s), for one or more of the Contract bid items. Each stipulation shall be made on the "Stipulation for Foreign Iron or Steel Materials" form which shall be submitted with the Contractor's proposal. If the Contractor chooses to use ANY non-domestic iron or steel, the Contractor must submit a stipulation with the proposal.

S-19.3 Prior to completing work the Contractor shall submit to the Engineer a certification stating that all iron and steel items supplied are of domestic origin, except for non-domestic iron and steel specifically stipulated and permitted in accordance with the paragraph above.

S-19.4 Source of Supply and Quality. Mn/DOT 1604 is supplemented as follows: All costs of shop inspection at plants outside the United States shall be borne by the Contractor. Such costs shall be deducted from monies due or to become due the Contractor.

S-19.5 Partial Payment. All provisions for partial payments shall apply to domestic materials only. No payments shall be made to the Contractor for materials manufactured outside of the United States until such materials have been delivered to the job site.

S-20 (1701) LAWS TO BE OBSERVED (DATA PRACTICES)

SP2005-27.1

The provisions of MnDOT 1701 are supplemented with the following:

S-20.1 Bidders are advised that all data created, collected, received, maintained, or disseminated by the Contractor and any subcontractors in performing the work contained in this Contract are subject to the requirements of MN Statute Chapter 13, the Minnesota Government Data Practices Act (MGDPA). The Contractor shall comply with the requirements of the MGDPA in the same manner as the Department. The Contractor does not have a duty to provide access to public data to the public if the public data are available from the Department, except as required by the terms of the Contract.

S-21 (1706) EMPLOYEE HEALTH AND WELFARE

SP2005-32

The provisions of MnDOT 1706 are supplemented with the following:

S-21.1 All construction operations shall be conducted in compliance with applicable laws, regulations and industry standards as described in MnDOT 1706. The Contractor shall be considered to be fully responsible for the development, implementation and enforcement of all safety requirements on the Project, notwithstanding any actions MnDOT may take to help ensure compliance with those requirements.

S-21.2 The Contractor shall submit a written safety program to the Engineer at the pre-construction conference addressing safety issues for all Project activities. This program shall contain name(s) of person(s) responsible for all safety requirements and this Contractor's Designee(s) shall be available at all times that work is being performed. The Contractor's designee(s) shall be responsible for correcting violations on the Project as observed by the Engineer or his/her representative.

S-21.3 The Contractor shall not use any motor vehicle equipment on this Project having an obstructed view to the rear unless:

(A) The vehicle has a reverse signal alarm which is audible above the surrounding noise level; or

(B) The vehicle is backed up only when an observer signals that it is safe to do so.

S-21.4 A $500.00 monetary deduction (per incident) will be assessed by MnDOT for violations of safety standards and requirements that have the potential for loss of life and/or limb of Project personnel or the public. The areas of special concern include, but are not limited to excavation stability protection, fall protection, protection from overhead hazards, vehicle backup protection (see S-21.3 above), confined space safety, blasting operations, and personal safety devices.

S-21.5 None of the monetary deductions listed above shall be considered by the Contractor as allowance of noncompliance incidents of these safety requirements on this Project.

S-22 (1707) PUBLIC CONVENIENCE AND SAFETY MODIFIED

Section 1707 is hereby supplemented to include the following:

S-22.1 The Contractor shall remove, store and replace all mailboxes, etc., that may interfere with the installation of utilities and grading. The Contractor shall contact and receive permission from the property owner before removing or relocating any mailboxes. Such work shall be paid under Item Number 2540.602 Relocate Mailbox Support. Damage to mailboxes, etc., during removal, storage shall be corrected and/or repaired by the Contractor.

S-22.2 Mailboxes shall not be disturbed until actual construction warrants removal. No such removal shall take place until the Engineer is on-site, has approved of and is witness to the work. Removed mailboxes shall be relocated to a temporary location subject to the approval of the Engineer, the homeowner and the U.S. Postal Service. Removed mailboxes shall be relocated promptly so as to prevent any interruption in postal service.

S-23 (1710) TRAFFIC CONTROL DEVICES

SP2005-34

All traffic control devices and methods shall conform to the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD), Minnesota Standard Signs Manual, the Traffic Engineering Manual, and the following:

In accordance with the MN MUTCD all sign supports shall be crashworthy. Signs installed on barricades, barricade sign combinations, and all other portable supports shall be crashworthy. This includes all new and used Category I and Category II devices.

The Contractor shall provide the Project Engineer a Letter of Compliance stating that all of the Contractors Category I and II Devices are NCHRP 350 approved as of July 1, 2006. The Letter of Compliance must also include approved drawings of the different signs and devices and shall be provided to the Project Engineer at the Pre-construction meeting.

S-24 (1712) PROTECTION & RESTORATION OF PROPERTY & LANDSCAPE - MODIFIED

Protection and restoration of property and landscape shall be done in accordance with the requirements of 1712, except as modified below:

S-24.1 Any signs that interfere with construction and are adjusted or removed by authorization of the Engineer shall be reset in their original location, by the Contractor, prior to leaving the project each day. Said signs shall be set in a temporary location, in a manner approved by the Engineer, during construction hours. Permanent replacement of traffic control devices, upon completion of all work, shall be by the County.

S-25 (1714) RESPONSIBILITY FOR DAMAGE CLAIMS; INSURANCE

SP2005-35.1

The provisions of MnDOT 1714 are hereby deleted and replaced with the following:

The Contractor shall indemnify, defend, and save harmless the Department, its officers, and its employees from all suits, actions, and claims of any character brought because of injuries or damages received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of the Contractor; or because of any claims arising or amounts recovered from infringements of patent, trademark, or copyright; or because of any claims arising or amounts recovered under the Workers' Compensation Act, or under any other law, ordinance, order, or decree.

The Department may retain for its use money that is due the Contractor under this or any other contract with the Department, as the Department deems necessary to protect its interests with respect to any suits, actions, or claims arising on account of the Contractor's operations or in consequence of any act, neglect, omission, or misconduct of the Contractor; or, in case no money is due, the Contractor's Sureties may be held liable until those suits, actions, or claims have been settled and suitable evidence to that effect has been furnished to the Department.

The Contractor shall identify a contact person for damage complaints from the public, and shall maintain a log of such complaints and any action taken by the Contractor. This log shall be available to the Engineer at his request.

A Workers' Compensation Insurance

Contractor shall provide workers' compensation insurance for all employees and shall require any subcontractors to provide workers' compensation insurance in accordance with the statutory requirements of the State of MN and must include:

a. Part 2, Employers' Liability including Stop Gap Liability for monopolistic states.
   Minimum limits:
   $100,000 – Bodily Injury by disease per employee
   $500,000 – Bodily Injury by disease aggregate
   $100,000 – Bodily Injury by accident
b. Coverage C: All States Coverage
c. If applicable, USL&H, Maritime, Voluntary and Foreign Coverage
d. Waiver of subrogation in favor of the Department

If Contractor is self-insured for its obligation under the Workers' Compensation Statutes in the jurisdiction where the project is located, a Certification of the Authority to Self-Insure such obligations shall be provided.

The Contractor must require Subcontractors to file evidence of insurance with the Contractor

B Commercial General Liability Insurance

The Contractor shall maintain insurance to cover liability from operations under the contract, whether such operations are by the Contractor, subcontractor or by anyone directly or indirectly employed under the Contract.

Minimum Limits of Liability
$2,000,000 – Per Occurrence
$2,000,000 – Annual Aggregate
$2,000,000 - Annual Aggregate applying to Products and Completed Operations
$50,000 – Fire Damage
$5,000 – Medical Expense (any one person per occurrence)

Coverages

- Premises and Operations Bodily Injury and Property Damage
- Personal and Advertising Injury
- Products and Completed Operations Liability
- Contractual Liability as provided in ISO form CG 00 01 12 04 or its equivalent
- Pollution exclusion with standard exception as per ISO Commercial General Liability Coverage Form – CG 00 01 12 04 or equivalent
- Explosion, Collapse and Underground (XCU) perils
- Broad Form PD
- Independent Contractors – Let or Sublet work
- Waiver of subrogation in favor of the Department
- Department named as an Additional Insured, by endorsement, ISO Forms CG 2010 and CG 20 37 or their equivalent for claims arising out of the Contractor's negligence or the negligence of those for whom the Contractor is responsible.

C Automobile Liability Insurance

Contractor shall maintain insurance to cover liability arising out of the operations, use, or maintenance of all owned, non-owned, and hired automobiles.

Coverages

- Owned Automobiles
- Non-owned Automobiles
- Hired Automobiles
- Waiver of subrogation in favor of the Department

Minimum Limit of Liability
$2,000,000 – Per Occurrence Combined Single Limit for Bodily Injury and Property Damage

Umbrella or Excess Liability Insurance
An Umbrella or Excess Liability insurance policy may be used to supplement the Contractor's policy limits to satisfy the full policy limits required by the Contract.

D Additional Conditions

Contractors' policy(ies) shall be primary and non-contributory insurance to any other valid and collectible insurance available to the Department with respect to any claim arising out of the Contract.

Evidence of subcontractor insurance shall be filed with the Contractor.

The Contractor is responsible for payment of Contract related insurance premiums and deductibles.

Insurance companies must have an AM Best rating of A- (minus) and a Financial Size Category of VII or better, and be authorized to do business in the State of Minnesota.

Certificates of Insurance acceptable to the Department shall be submitted prior to commencement of work under the Contract. Such Certificates and the required insurance policies shall contain a provision that coverage afforded under these policies shall not be cancelled without at least thirty (30) days advance written notice to the Department.

E Notice to the Contractor

The failure of the Department to obtain Certificate(s) of Insurance for the policies or renewals thereof or failure of the insurance company to notify the State of the cancellation of policies required under this Contract shall not constitute a waiver by the Department to the Contractor to provide such insurance.

The Department will reserve the right to terminate the Contract in accordance with 1808 if the Contractor is not in compliance with the insurance requirements and the Department retains all rights to pursue any legal remedies against the Contractor. In the event of a claims dispute, all insurance policies must be open to inspection by the Department, and copies of policies must be submitted to Department's authorized agent upon written request.

S-26 (1717) AIR, LAND AND WATER POLLUTION

SP2005-36

The provisions of MnDOT 1717 are supplemented and/or modified with the following:

S-26.1 DISCOVERY OF CONTAMINATED MATERIALS AND REGULATED WASTES

If during the course of the Project, the Contractor unexpectedly encounters any of the following conditions indicating the possible presence of contaminated soil, contaminated water, or regulated waste, the Contractor shall immediately stop work in the vicinity, notify the Engineer, and request suspension of work in the vicinity of the discovery area, in accordance with MnDOT 1803.4.

A documented inspection and evaluation will be conducted prior to the resumption of work. The Contractor shall not resume work in the suspected area without authorization by the Engineer.

(A) Indicators of contaminated soil, ground water or surface water include, but are not limited to the following:

(1) Odor including gasoline, diesel, creosote (odor of railroad ties), mothballs, or other chemical odor.
(2) Soil stained green or black (but not because of organic content), or with a dark, oily appearance, or any unusual soil color or texture.
(3) A rainbow color (sheen) on surface water or soil.

(B) Indicators of regulated wastes include, but are not limited to the following:

(1) Cans, bottles, glass, scrap metal, wood (indicators of solid waste and a possible dump)
(2) Concrete and asphalt rubble (indicators of demolition waste).
(3) Roofing materials, shingles, siding, vermiculite, floor tiles, transite or any fibrous material (indicators of demolition waste that could contain asbestos, lead or other chemicals).
(4) Culverts or other pipes with tar-like coating, insulation or transite (indicators of asbestos).

(5) Ash (ash from burning of regulated materials may contain lead, asbestos or other chemicals).
(6) Sandblast residue (could contain lead).
(7) Treated wood including, but not limited to products referred to as green treat, brown treat and creosote (treated wood disposal is regulated).
(8) Chemical containers such as storage tanks, drums, filters and other containers (possible sources of chemical contaminants).
(9) Old basements with intact floor tiles or insulation (could contain asbestos), sumps (could contain chemical waste), waste traps (could contain oily wastes) and cesspools (could contain chemical or oily wastes).

S-26.2 MnDOT 1717.2 A2 is hereby deleted and replaced with the following:

A2 During Construction

The Contractor shall implement the Project's Storm Water Pollution Prevention Plan. The Contractor shall schedule and install temporary and permanent sediment and erosion control measures, construct ponds and drainage facilities, finish earth work operations, place topsoil, establish turf, and conduct other Contract work in a timely manner to minimize erosion and sedimentation.

All exposed soil areas with continuous positive slopes that are within 60 m (200 feet) of a public water shall have temporary or permanent erosion protection within 24 hours after the construction activity in that portion of the site has temporarily or permanently ceased and connection is established to the public water. All other positive slopes to constructed surface waters, such as permanent storm water treatment ponds, curb and gutter systems, storm sewer inlets, temporary or permanent drainage ditches, or other storm water conveyance systems, shall have temporary erosion protection or permanent cover for the exposed soil areas as soon as practicable but no later than 14 days after construction activity has temporarily or permanently ceased in that area. For those drainage areas that have a discharge point within 1 mile and flows to an impaired or Special Waters shall have temporary erosion protection or permanent cover for the exposed soil areas as soon as practicable but no later than 7 days after construction activity has temporarily or permanently ceased in that area. Impaired and Special Waters are defined as those listed and referenced in the NPDES Permit.

Positive slopes adjacent to public waters and wetlands will be stabilized at the close of each day when weather forecasts for rain that evening, and/or overnight including weekends. Once work is completed it will be stabilized permanently as soon as practical but no later than seven days.

Exposed soil areas do not include; stockpiles or surcharge areas of sand, gravel, aggregate, concrete, bituminous, or road bed and surfacing material. A perimeter sediment barrier may be necessary to minimize loss when these are within the 60 m (200 feet) of existing surface waters or the property edge.

The bottom of temporary or permanent drainage ditches or swales constructed to drain water from a construction site must be stabilized with erosion control measures for the last 60 m (200 feet), or more when conditions warrant, from the property edge or from the point of discharge to any existing surface water. Stabilization shall be completed within 24 hours after the construction activity in that portion of the ditch has temporarily or permanently ceased. Ditch stabilization will continue concurrently with construction activities but no later than 14 days after construction activities have permanently or temporarily ceased. Any, culvert pipe or storm sewer pipe that is within the cumulative distance is not part of this distance. Ditch checks may be provided where necessary to slow water flow and capture sediment.

Temporary or permanent ditches used as treatment systems will not need to be stabilized but must provide the proper Best Management Practices for the treatment system.

Pipe outlets shall be provided with temporary or permanent energy dissipation within 24 hours of connecting the pipe to any constructed or existing surface waters.

The Contractor shall limit the surface area of erodible soil that can be exposed to possible erosion at any one time when the permanent erosion control features are not completed and operative.

All liquid and solid wastes generated by concrete washout operations must be contained and not have the opportunity to come in contact with the surface waters or ground water. This includes the ditches, slopes to ditches, curb and gutter/stormsewer systems, and ponds. Areas where there are sandy soils, karsts, and high ground water the washout facility must have an impermeable liner. Liquid and solid wastes must be disposed of properly. A concrete washout sign must be installed adjacent to each washout facility to notify personnel.

S-26.3 MnDOT 1717.2E is hereby deleted and replaced with the following:

E Site Plans

The Engineer may require the Contractor to submit a site plan, in writing, detailing proposed erosion control and sediment control measures and a schedule indicating starting and completion times for construction operations working in water bodies and/or in direct proximity to waters of the state.

Contractor shall not start work in the affected areas until the schedule and site plan have been accepted by the Engineer and all materials and equipment for the activity are on site.

S-27 (1717) AIR, LAND AND WATER POLLUTION (CONCRETE GRINDING)

SP2005-36.1

The provisions of MnDOT 1717 are supplemented and/or modified with the following:

S-27.1 All slurry material shall become property of the Contractor and must be disposed of as per MnDOT 2104.3C3 as approved by the Engineer, and as described below.

All concrete residue and water (slurry) resulting from concrete grinding operations must be continuously vacuumed from the surface, captured, and containerized for further handling or processing. The slurry must not be permitted to flow across lanes occupied by traffic, flow into drainage facilities or discharge anywhere within the highway Right of Way. The Contractor must submit a slurry disposal or reuse plan at the preconstruction conference for approval by the Engineer.

The method to manage the slurry may require separation of the solids from the liquids. This separation may be achieved mechanically by centrifuging or passively by allowing settlement of the fines to occur in a temporary impermeable lined containment area. If a temporary containment area is used within the highway Right of Way, a Site Plan as per 1717 will be required for the Engineer's approval. The minimum Site Plan shall include methods for storm water protection at the temporary containment area, a description of the proposed separation method, and the process for final removal and restoration of the disturbed containment area. For any method used to separate the liquid from the solids, the Contractor shall identify the name and location of the publicly owned treatment works facility (POTW) that the liquids will be deposited in, or how the processed water will be reused by the Contractor.

As part of the slurry disposal or reuse plan, the Contractor must be able to provide, upon request, documentation that identifies the name and location of the MPCA permitted lined mixed municipal solid waste (MMSW) or industrial landfill that the solids will be deposited in, or identifies any alternative methods of disposal or reuse that meet environmental requirements of regulated industrial waste.

The Contractor shall hold MnDOT harmless for any fines or sanctions caused by the Contractor's actions or inactions regarding compliance with concrete slurry management and disposal. All materials and labor for installation of storm water protection practices, maintenance, control, removal and disposal for the management of concrete slurry is incidental to the concrete grinding operation.

S-28 (1717) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

SP2005-37

Pollution of natural resources of air, land and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (M.P.C.A.), and in accordance with the provisions of MnDOT 1717, these Special Provisions, and the following:

S-28.1 By signing the Proposal and completing the NPDES permit application, the Contractor is a co-permitee with the Department to ensure compliance with the terms and conditions of the General Storm Water Permit (MN R100001) and is responsible for those portions of the permit where the operator is referenced. This Permit establishes conditions for discharging storm water to waters of the State from construction activities that disturb 0.4 hectares [1 acre] or more of total land area. A copy of the "General Permit Authorization to Discharge Storm Water Associated with a Construction Activity Under the National Pollutant Discharge Elimination System (NPDES)/State Disposal System Permit Program" is available at http://www.pca.state.mn.us/water/stormwater/stormwater-c.html or by calling 651-296-3890.

(A) The Contractor shall apply and pay for the NPDES Permit on this Project. Payment for the application shall be incidental to the Contract and no direct compensation will be made. The Department will provide the Contractor with the application form with Sections 1 thru 3 and 5 thru 14 completed, as part of the Contract document package. The Contractor shall fill out the Contractor's portion (Section 4 and Section 15), complete the application process, and post the Permit and MPCA's letter of coverage onsite.

A NPDES Permit Declaration form will be sent to the Contractor with the Contract award packet. A copy of the signed permit application and a signed Permit Declaration form must be returned with the Contract and Bond. Submittal of the copy of the signed permit application and Permit Declaration is mandatory for Contract approval. No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the NPDES Permit is in effect and the Department has received the required documentation.

S-28.2 The Contractor shall be solely responsible for complying with the requirements listed in Part II.B and Part IV of the General Permit.

The Contractor shall be responsible for providing all inspections, documentation, record keeping, maintenance, remedial actions, and repairs required by the permit. All inspections, maintenance, and records required in the General Permit Paragraphs IV.E, shall be the sole responsibility of the Contractor. The word "Permitee" in these referenced paragraphs shall mean "Contractor". Standard forms for logging all required inspection and maintenance activities shall be used by the Contractor. All inspection and maintenance forms used on this Project shall be turned over to the Engineer every two weeks for retention in accordance with the permit.

The Contractor shall have all logs, documentation, inspection reports on site for the Engineer's review and shall post the permit and MPCA's letter of coverage on site. The Contractor shall immediately rectify any shortcomings noted by the Engineer. All meetings with the MPCA, Watershed District, WMO, or any local authority shall be attended by both the Engineer and the Contractor or their representatives. No work required by said entities, and for which the Contractor would request additional compensation from MnDOT, shall be started without approval from the Engineer. No work required by said entities and for which the changes will impact the design or requirements of the Contract documents or impact traffic shall be started without approval from the Engineer.

The Contractor shall immediately notify the Engineer of any site visits by Local Permitting Authorities performed in accordance with Part V.H.

S-28.3 Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events. It is required to notify the MPCA Regional Contact Person within 2 days of an uncontrolled storm water release. The names and phone numbers of the MPCA Regional Contract personnel can be found at: http://www.pca.state.mn.us/water/stormwater/stormwater-c.html. The

Contractor is reminded that during emergency situations involving uncontrolled storm water releases that the State Duty Officer must be contacted immediately at 1-800-422-0798 or 1-651-649-5451.

S-28.4 The Contractor shall review and abide by the instructions contained in the permit package. The Contractor shall hold MnDOT harmless for any fines or sanctions caused by the Contractor's actions or inactions regarding compliance with the permit or erosion control provisions of the Contract Documents.

S-28.5 The Contractor is advised that Section 1 of the NPDES application form makes reference to a Storm Water Pollution Prevention Plan (SWPPP). This Projects' SWPPP is addressed throughout MnDOT's Standard Specifications for Construction, as well as this Project's Plan and these Special Provisions. The following table identifies NPDES permit requirements and cross-references where this Contract addresses each requirement.

NPDES Permit Requirements	Cross-Reference within this Contract
Obtain NPDES Permit; Permit Compliance; Submit Notice of Termination	MnDOT 1701, 1702; and 1717 Special Provisions: 1717 (Air, Land & Water Pollution), 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Certified Personnel in Erosion / Sediment Control Site Management Develop a Chain of Command	MnDOT 1506, 1717, and 2573; Special Provisions: 1717 (Air, Land & Water Pollution), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Project / Weekly Schedule (for Erosion / Sediment Control) Completing Inspection / Maintenance Log / Records	MnDOT 1717 and 2573; Special Provisions: 1717 (Air, Land & Water Pollution), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and
Project Specific Construction Staging	The Plans; MnDOT 1717; Special Provisions: 1717 (Air, Land & Water Pollution), 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and 1806 (Determination and Extension of Contract Time)
Temporary Erosion / Sediment Control	The Plans; MnDOT 2573 and 2575
Maintenance of Devices / Sediment removal Removal or Tracked Sediment Removal of Devices	The Plans; MnDOT 1717 and 2573; Special Provisions: 1514 (Maintenance During Construction), 1717 (Air, Land & Water Pollution), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Dewatering	MnDOT 2105.3B and 2451.3C; May also require DNR Permit
Temporary work not shown in the Plans Grading areas (unfinished acres exposed to erosion)	MnDOT 1717, 2573, and 2575; Special Provisions: 1717 (Air, Land & Water Pollution), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Permanent Erosion / Sediment Control and Turf Establishment	The Plans; MnDOT 1717, 2573, and 2575; Special Provisions: 1717 (Air, Land & Water Pollution), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)

S-29 (1718) FURNISHING RIGHT OF WAY

SP2005-38

No work shall be performed by the Contractor outside the existing Right of Way without the authority of the Project Engineer.

S-30 (1803) PROSECUTION OF WORK

The provisions of 1803 are modified to the extent that the "Progress Schedule" (bar chart or critical path diagram) referenced in 1803.1 and elsewhere will not be required on this Project. This shall, however, in no way lessen the Contractor's responsibility for (1) providing the Engineer with the notifications required by the provisions of 1803.2; and (2) prosecuting the work diligently, as required therein, so as to assure satisfactory progress towards a timely completion of the Project. No work shall be performed during the hours of darkness as determined by the Engineer.

S-31 (1806) DETERMINATION AND EXTENSION OF CONTRACT TIME

SP2005-44

The Contract Time will be determined in accordance with the provisions of MnDOT 1806 and the following:

S-31.1 Construction operations shall be started on May 7, 2012 or within eight (8) Calendar Days after the date of Notice of Contract Approval, whichever is later. Construction operations shall not commence prior to Contract Approval.

S-31.2 All work required under this Contract, except maintenance work and Final Clean Up shall be completed on or before August 24, 2012.

S-31.3 No work which will restrict or interfere with traffic shall be performed between 12:00 noon on the day preceding and 9:00 A.M. on the day following any consecutive combination of a Saturday, Sunday, and legal holiday without written permission from the Engineer.

S-31.4 The Contractor is advised that the Contract Time (Completion Date) is based on an accelerated work schedule that may include six (6) day work week, Monday through Saturday.

S-32 (1807) FAILURE TO COMPLETE THE WORK ON TIME

Liquidated Damages will be assessed in accordance with the provisions of MNDOT 1807.

S-32.1 The Department may reduce the daily liquidated damages to $500 per day when the only remaining items are maintenance or Final Cleanup.

S-32.2 For informational purposes only, bidders are advised that in addition to the requirements of MnDOT 1807, other Sections of these Special Provisions, as shown below, contain requirements for assessment of monetary deductions to this Contract:

1404	MAINTENANCE OF TRAFFIC AND (2563) TRAFFIC CONTROL
1506	SUPERVISION BY CONTRACTOR
1507	UTILITY PROPERTY AND SERVICE
1706	EMPLOYEE HEALTH AND WELFARE
1803	PROSECUTION OF WORK
2563	TRAFFIC CONTROL SUPERVISOR

S-32.3 The liquidated damages set forth in MnDOT 1807 and any monetary deductions as set forth above may apply equally, separately, and may be assessed concurrently.

S-33 (1901) MEASUREMENT OF QUANTITIES

SP2005-46

The provisions of MnDOT 1901 are supplemented by the following:

S-34 (1904) EXTRA AND FORCE ACCOUNT WORK - MODIFIED

Measurement of quantities shall be in accordance with the provisions of 1901, and the following:

S-34.1 During each days production, loads will be selected at random by the Engineer for spot checks of total tons being hauled from the producing plant. These spot checks will be taken two or more times each day, to ensure that the actual load is equal to or exceeds the established uniform load weight. The results of these tests shall be recorded and the spot-check tickets given to the County as documentation of uniform loads. The loads selected for scale check shall be weighed by the Contractor on a platform scale which is large enough to weigh the entire hauling vehicle in one operation and which is accurate to within one percent (1%) of the net load weighed. If a commercial platform scale is used for the scale check, it shall have currently been tested and approved by the Division of Weight and Measures of the Minnesota Department of Public Service. Other scales may be tested by the Contractor in the presence of the Engineer or by the Divisions of Weight and Measures, Minnesota Department of Public Service. This will be considered incidental work and no direct compensation will be made therefore.

S-34.2 If a belt scale is used, it shall have automatic shutoff controls that can be calibrated for more than one net weight. Manual control of shutoff controls will not be permitted. All costs that the Contractor may incur as a result of this work will be considered to be incidental to the type of aggregate being weighed and no direct compensation will be made therefore.

S-34.3 The following sentence shall be added to the second paragraph of MnDOT 1904:

"Under no circumstance will the negotiated unit price for Extra Work which is performed by a subcontractor include a Prime Contractor allowance which exceeds that provided for in 1904(4), Paragraph 3."

S-35 (1906) PARTIAL PAYMENTS - MODIFIED

Partial payments shall be made in accordance with the requirements of 1906, except as modified below:

S-35.1 The first line of the third paragraph is modified to read: From the amounts ascertained as payable on each partial estimate, five (5) percent will be retained until final payment is made, unless reduced by authorization of the Engineer, on the last partial payment.

S-36 (1910) FUEL ESCALATION CLAUSE - MODIFIED

The provisions of 1910 are hereby deleted. There will be no fuel cost adjustment for fuel escalation.

S-37 (2051) MAINTENANCE AND RESTORATION OF HAUL ROADS

Maintenance and restoration of haul roads shall be done in accordance with the provisions of 2051 except as modified below:

S-37.1 Prior to hauling of any materials on this project, Contractor shall submit a list of proposed haul roads to the Engineer for his approval. The Contractor shall also submit a list of all township roads that are proposed to be used as haul roads to the township official for their approval.

S-37.2 Contractor will be required to maintain and restore haul roads as per Specification No. 2051.4 Any costs that the Contractor may incur during this operation will be considered incidental and no direct compensation will be made therefore.

S-38 (2101) CLEARING AND GRUBBING - MODIFIED

SP2005-59

Clearing and grubbing operations shall be performed in accordance with the provisions of MnDOT 2101 and the following:

S-38.1 BURNING OF TREES WILL NOT BE ALLOWED IN CITY LIMITS

S-38.2 The first paragraph of MnDOT 2101.3D Disposal Limitations, is revised to read as follows:

The Contractor shall dispose of trees, brush, stumps, roots, and other debris or byproducts by chipping, marketing,. The Contractor:

S-38.3 MnDOT 2101.3D(4) under Disposal Limitations, is revised to read as follows:

(4) Shall conduct burning only after the disposal options are deemed impractical, and in accordance with 2104.3, Minnesota Rules Chapter 7009 and any applicable local ordinances. At no time shall waste tires, rubble, or plastics or similar materials be used to ignite the wood resources.

S-38.4 MnDOT 2101.3D(5) under Disposal Limitations, is revised to read as follows:

(5) Shall not bury trees, brush, stumps, roots, and other debris or by-products within the State Right of Way.

S-38.5 MnDOT 2101.3D1(a) under Marketable Trees, is revised to read as follows:

(a) Shall not burn or waste marketable trees without having written proof from three potential wood-using industries or individuals that the wood is not wanted. This requirement only applies when the volume of marketable trees on the Project exceeds 75 m^3 (100 cubic yards or 20 cords or 10,000 board feet).

S-38.6 MnDOT 2101.3D2c(3) under Disposal Deadlines and Locations, is revised to read as follows:

(3) Within the Right of Way by burning or chipping, when allowed.

S-38.7 The first paragraph of MnDOT 2101.3D3 Pine, is revised to read as follows:

The Contractor shall dispose of all non-marketable pine trees, brush, stumps, roots, and debris by chipping, debarking, burning, or covering with an air tight tarp within 20 calendar days of being cleared during the growing season.

S-38.8 MnDOT 2101.3D6 Burying, is hereby deleted in its entirety.

S-38.9 The first paragraph of MnDOT 2101.4B Area Basis, is revised to read as follows:

When the hectare is the unit, quantities will be determined by measuring (to the nearest 0.02 hectare (0.05 acre)) all areas cleared and all areas grubbed, within the limits shown in the Plans or staked by the Engineer. All measurements will be made horizontally to points 3 m (10 feet) outside the trunks of qualifying trees or stumps on the perimeter of the area being measured. Separate areas smaller than 0.02 hectare (0.05 acre) will be considered to be 0.02 hectare (0.05 acre).

S-38.10 The first paragraph of MnDOT 2101.5 Basis of Payment, is revised to read as follows:

Payment for the accepted quantities of clearing and grubbing at the Contract prices per unit of measure will be full compensation for all removal and disposal costs, including the costs of

securing outside disposal sites as needed and of carrying out the specified treatment in disposing of elm, oak wilt infected red oaks, pine, and marketable trees.

S-38.11 The Contractor shall remove only those trees necessary to be removed to construct this Project. All other trees shall be protected from damage during construction.

S-38.12 The Contractor shall take special care to preserve existing trees and shrubs wherever possible. This may include careful grading operations, slight adjustments of slopes, and placing snow fence at tree drip lines.

S-39 (2104) REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES - MODIFIED

SP2005-62

Abandoned structures and other obstructions shall be removed from the Right of Way and disposed of in accordance with the provisions of MnDOT 2104, except as modified below:

S-39.1 Measurement and payment for the removal and disposal of materials will be made only for those Items of removal work specifically included for payment as such in the Proposal and as listed in the Plans. The removal of any unforeseen obstruction requiring in the opinion of the Engineer equipment or handling substantially different from that employed in excavation operations, will be paid for as Extra Work as provided in MnDOT 1403.

S-39.2 All removals shall be disposed of by the Contractor outside the Right of Way in accordance with MnDOT 2104.3C3 to the satisfaction of the Engineer.

S-39.3 The bituminous pavement to be left in place shall be marked in the field by the Engineer and the Contractor shall saw the pavement in a manner that will not damage the surface left in place. The Contractor shall use a concrete or similar type saw. The use of jack-hammers or similar type equipment will not be permitted.

S-39.4 The bituminous pavement and miscellaneous structures shall be removed and disposed as per requirements of 2104 and shall become the property of the Contractor.

S-40 (2104) ABANDON CULVERT

SP2005-72

This work shall consist of sealing and abandoning an existing culvert in accordance with the applicable MnDOT Standard Specifications, as noted in the Plan, and the following:

S-40.1 The abandoned culvert shall be filled with granular material and capped watertight. Filling and capping of the abandoned culvert shall be considered incidental work for which no direct payment will be made.

S-40.2 Measurement will be made by Each culvert sealed and abandoned as specified. Payment will be made under Item 2104.603 (Abandon Pipe Sewer) at the Contract bid price per Each, which shall be payment in full for all costs involved.

S-41 (2104) REMOVE LIGHTING UNIT - MODIFIED

This work shall consist of salvaging an existing street light pole, luminaries, and other attached fixtures and delivering it to the City of Mankato Public Works Department.

S-41.1 Remove Lighting Unit includes, but is not limited to, salvaging, storing, transporting, and coordinating. Any items that are damaged shall be repaired at the Contractors expense. Removal of the lighting unit footing or foundation shall be incidental to payment of Item 2104.509 Remove Lighting Unit.

S-41.2 Measurement will be made by the each street light that is removed, as specified in the Plan. Payment will be made under Item 2104.509 (Remove Lighting Unit) at the Contract bid price per each, which shall include but not be limited to all items as specified above or called out in the plan.

S-42 (2105) EXCAVATION AND EMBANKMENT - MODIFIED

SP2005-73

Roadway excavation and embankment construction shall be performed in accordance with the provisions of MnDOT 2105, except as modified below:

S-42.1 MnDOT 2105.2A2 Rock Excavation is revised to read as follows:

Rock excavation shall consist of all materials that cannot, in the Engineer's opinion, be excavated without drilling and blasting or without the use of rippers, together with all boulders and other detached rock each having a volume of 1 cubic meter (1 cubic yard) or more, but exclusive of those quantities that are to be paid for separately under the item of rock channel excavation.

S-42.2 The last paragraph in MnDOT 2105.3B Preparation of Embankment Foundation, is revised to read as follows:

Before backfilling depressions within the roadway caused by the removal of foundations, basements, and other structures, the Contractor shall enlarge the depressions as directed by the Engineer.

S-42.3 The first and second sentences in the second paragraph in MnDOT 2105.3D Disposition of Excavated Material, are revised to read as follows:

When the soils are so varied that selection and placement of uniform soils is not practical, the Contractor shall use disks, plows, graders or other equipment to blend and mix suitable soils to produce a uniform soil texture, moisture content and density; except that, all soils that contain 20 percent or more particles passing the 75 *u*m (#200) sieve shall be blended, mixed and dried with a disk, within the entire upper 2 meters (6 feet) of embankment. The disk shall meet the requirements of 2123 N, Disk Harrow. A disk is also to be used below the upper 2 meters (6 feet) of the embankment fill area, if in the opinion of the Engineer, the Contractor is not producing a uniform soil texture.

S-42.4 The fifth paragraph in MnDOT 2105.3D Disposition of Excavated Material, is revised to read as follows:

Peat, muskeg, and other unstable materials that are not to be used in the roadbed embankments shall be deposited in the areas indicated in the Plans or elsewhere as approved by the Engineer. All other material that is considered unsuitable for use in the upper portion of the roadbed shall be placed outside of a 1:1 slope down and outward from the shoulder lines on fills under 10 m (30 feet) in height or outside of a 1 vertical to 1.5 horizontal slope down and outward from shoulder lines on fills over 10 m (30 feet) in height, or used to flatten the embankment slopes, or disposed of elsewhere as approved by the Engineer.

S-42.5 The second sentence in the eighth paragraph of MnDOT 2105.3D Disposition of Excavated Material, is revised to read as follows:

No stones exceeding 150 mm (6 inches) in greatest dimension will be permitted in the upper 1 m (3 feet) of the roadbed embankment.

S-42.6 The fourth to last paragraph in MnDOT 2105.3D Disposition of Excavated Material, which begins with "All combustible debris materials (stumps, roots, logs, brush, etc.) together with all..." is hereby deleted and replaced with the following:

All noncombustible materials other than soils (oversized rock, broken concrete, metals, plastic pipe, etc.) shall be disposed of in accordance with 2104.3C.

S-42.7 The ninth paragraph of MnDOT 2105.5 is hereby deleted and replaced with the following:

If the Proposal fails to include a bid item for rock excavation or rock channel excavation, and material is uncovered that is so classified, excavation of the rock will be paid for separately at the Contract price for common excavation or common channel excavation, plus an additional $26.00 per cubic meter ($20.00 per cubic yard) . If no bid item is provided for common channel excavation, excavation of materials classified as rock channel excavation will be paid for at the Contract price for common excavation plus an additional $28.00 per cubic meter ($21.50 per cubic yard). Such stipulated prices for rock excavation will apply up to a maximum of 200 m3 (260 cubic yards) of excavation per item or to such quantity as may be performed by mutual consent prior to execution of an Extra Work agreement.

S-42.8 The eleventh paragraph of MnDOT 2105.5 is hereby deleted and replaced with the following:

(a) That portion of the additional excavation that is removed from below a plane parallel to and 5 m (15 feet) below the natural ground surface will be measured in 2 m (5 foot) depth zone increments and paid for separately at adjusted unit prices. The adjusted unit price will be equal to the Contract bid price for muck excavation plus $0.39 per cubic meter ($0.30 per cubic yard) for the additional excavation within the 5-7 m (15-20 foot) depth zone and an additional $0.26 per cubic meter ($0.20 per cubic yard) for each additional 2 m (5 foot) increment of depth beyond 7 m (20 feet).

S-42.9 Compaction of all embankment construction, including culvert backfills, shall be obtained by the "Quality Compaction" method described in MnDOT 2105.3F.

S-42.10 Excess soils and rock not used on the Project shall be first deposited in the obliterate sections of CSAH 60 (Stadium Road). Following completion of the obliterate fill additional topsoil only may be placed from approximate Station 17+00 to 30+00 in a taper section from the Right of Way limits to approximately 50' beyond the Right of Way limits in the adjacent agricultural field as directed by the Engineer. Disposal sites shall be left in a well graded condition with all solid wastes and boulders adequately covered.

S-42.11 No disposal shall occur in those areas defined below as "environmentally sensitive" unless the Contractor can document that: 1) non-sensitive areas are not available; or that 2) the material can be used to benefit an "environmentally sensitive" area. All necessary permits for the disposal operations shall be obtained by the Contractor and approval from the appropriate State and Federal Agencies shall be included in the Contractor's Disposal Plan.

(A) No disposal shall occur in the following "environmentally sensitive" area:

(1) Wetlands, as described in "Wetlands of the United States", Circular 39, published by the U.S. Department of Interior, Fish and Wildlife Service;
(2) 100-year frequency flood plains;
(3) Archaeological or historic sites – See Section S-1701 (LAWS TO BE OBSERVED (CULTURAL RESOURCES)) of these Special Provisions for specific requirements;
(4) Areas with stability or settlement problems;
(5) Areas with artesian conditions;
(6) Unique animal or plant communities;
(7) Landscapes or geologic formations with exemplary, unique, rare or threatened/endangered characteristics.

(B) Any environmentally sensitive areas shown in the Plan are approximate only. If it is anticipated that said areas may be affected by disposal site usage and/or any of the Contractor's operations, the Engineer will determine exact limits on an "as needed basis".

(C) Prior to the disposal of any excess grading materials, concrete rubble, bituminous materials, or any other materials requiring disposal, the Contractor shall have on file a written Disposal Plan with written approval by the Engineer. The written Disposal Plan must reflect not only the above requirements, but also the following points:

(1) That legal permission from the property owner has been obtained;
(2) That all required local and county disposal permits have been obtained;
(3) That the MPCA has reviewed and granted permits as necessary for solid waste disposal;
(4) That the disposal area and Plan meet with requirements of the U.S. Fish and Wildlife Service as noted in Executive Order 11990 and Circular 39, as verified by field review. In this regard, the Contractor shall give notice sufficient to permit the Engineer and a representative from the MnDOT Office of Environmental Services to conduct a site review; and
(5) That the limits of the disposal area will be staked by the Contractor so as to accommodate the site review and aid the Contractor in limiting disposal operations so that encroachments do not inadvertently occur.

S-42.12 At the preconstruction meeting, the Contractor shall present to the Engineer his proposed plan for construction, including as a minimum, his hauling operation and the amount, size, and type of equipment he will use for the project.

S-42.13 Material which is excavated and determined by the Engineer or the Engineer's representative to be suitable material shall be used for embankment construction or backfill. The suitable materials shall not be mixed with or contaminated with unsuitable soil in any amounts. Selection of suitable materials shall be considered to be incidental to the contract, with no direct compensation therefore. Any stockpiling or re-handling of these materials shall be considered incidental to the contract with no direct compensation therefore.

S-42.14 No topsoil shall be placed on the in-slopes until the slopes are approved by the Engineer.

S-42.15 The rate of depositing material on the embankment shall not exceed the capacity of the leveling and compaction equipment as determined necessary by the Engineer. Compaction of this material should not be delayed after being placed.

S-42.16 In areas to be seeded with 310 mixture the Contractor shall excavate to original organic soils. If no organic soils are present following excavation the Contractor shall place topsoil at a minimum depth of 6" in these areas. Payment for this work shall be included in Common Excavation.

S-42.17 Any Excess Salvaged Aggregate not incorporated into the project shall be stockpiled for removal by Blue Earth County maintenance staff and become property of Blue Earth County.

S-42.18 In areas to be cultivated or used as agricultural fields the Contractor shall place topsoil with a dozer only, and then subsoil the topsoil placed to a depth equal to that of the topsoil placed or as directed by the Engineer. De-compaction will be incidental to Item No. 2105.501 Common Excavation for the topsoil layer.

S-42.19 A skidloader will be required for finish work and final shaping around pipe aprons, driveways and other miscellaneous smaller areas not adequately shaped by larger equipment as determined acceptable as determined by the Engineer.

S-42.20 The Contractor will provide a soil conditioner, a land plane, or approved equal to prepare the soil prior to seeding or sodding. The soil shall be decompacted and prepared to a smooth residential turf finish in all boulevard, residential and yard areas. This work shall be incidental to Item No. 2105.501 Common Excavation, no additional compensation will be made. No seeding will be performed in these areas until approved by the Engineer.

S-43 (2123) EQUIPMENT RENTAL

SP2005-89

The provisions of MnDOT 2123 are modified and/or supplemented with the following:

S-43.1 The following is added to MnDOT 2123.3 SPECIFIC REQUIREMENTS:

N Disk Harrow

The disk harrow shall be of sufficient size and mass to manipulate the soils to a depth of approximately 300 mm [12 inches] and shall meet the approval of the Engineer.

S-43.2 The following is added to MnDOT 2123.5 BASIS OF PAYMENT:

2123.610 Disk Harrow .....hour

S-44 (2130) APPLICATION OF WATER

SP2005-93

The provisions of MnDOT 2130 are modified as follows:

S-44.1 The third paragraph of MnDOT 2130.5 is hereby deleted and the following substituted therefore:

Water applied by order or approval of the Engineer for dust control will be paid for at a unit price of $5.45 per cubic meter ($20 per 1000 gallons) in the absence of the Contract bid Item 2130.501.

S-45 (2211) AGGREGATE BASE - MODIFIED

SP2005-94

Aggregate base courses shall be constructed in accordance with the provisions of MnDOT 2211 except as modified below:

S-45.1 Compaction shall be achieved by the "Quality Compaction Method" described in MnDOT 2211.3C.

S-45.2 The second sentence in MnDOT 2211.1 Description, is revised to read as follows:

The aggregate base shall be produced and placed under the Contractor's quality control program in accordance with the MnDOT Grading and Base Manual.

S-45.3 The last paragraph in MnDOT 2211. 3C2 Quality Compaction Method, is revised to read as follows:

The Engineer may elect to perform density tests as shown in the MnDOT Grading and Base Manual, as needed to assist inspection. The actual density obtained by testing the aggregate base must meet or exceed the requirements shown in 2211.3C1 Specified Density or 2211.3C3 Penetration Index Method in order to be acceptable.

S-45.4 The first sentence in MnDOT 2211.3F1 Gradation Control, is revised to read as follows:

The Contractor and/or aggregate producer shall be responsible for maintaining a gradation control program in accordance with the random sampling acceptance method described in the MnDOT Grading and Base Manual.

S-45.5 MnDOT 2211.3F2(d) under Acceptance Testing is hereby deleted and replaced with the following:

(d) Samples for gradation testing will be taken randomly by the Engineer prior to compaction, in accordance with the random sampling method described in the Grading and Base Manual. All gradation tests will be reported to the nearest whole number, except the 75µ [#200] sieve will be reported to the nearest one tenth of one percent (0.1%).

S-45.6 MnDOT 2211.3F2(j) under Acceptance Testing, is revised to read as follows:

(j) One gradation sample will be taken from each sublot and tested. Payment will be based on the average results from the four sublot samples for each specified sieve.

S-45.7 The third paragraph after MnDOT 2211.3F2(k) under Acceptance Testing, is revised to read as follows:

A 5% price reduction will be assessed to both individual or averaged test lots for each test result that fails to meet specified gradations for sieve sizes not listed in Tables 2211-B and 2211-C by more than 2%. These price reductions are cumulative and shall be analyzed both separately and averaged by lot when applicable.

S-45.8 Table 2211-B in MnDOT 2211.3F2 Acceptance Testing, is hereby deleted and replaced with the following:

Table 2211-B
AGGREGATE BASE PAYMENT SCHEDULE
(4 Sublots/4 Samples)

% Passing Outside Specified Limits*		
4.75 mm (#4), 2.00 mm (#10), and 425 µm (# 40) Sieves	75 µm (#200) Sieve	Acceptance Schedule (Price Reduction)
1	0.1	5%
----------	0.2	6%
----------	0.3	9%
----------	0.4	11%
----------	0.5	14%
2	0.6	15%
> 2	> 0.6	Corrective Action

*Based on average of 4 tests

Price reductions for more than one failing sieve size shall be cumulative. The compensation due to the Contractor for the quantity of material represented by the failing test results shall be reduced by the sum of the respective percentages.

The Contractor does not have the option of taking a price reduction in lieu of complying with the Specifications.

S-45.9 The following is added to Table 2211-C in MnDOT 2211.3F2 Acceptance Testing:

Substantial compliance will be applied to no more than one test failure. Substantial compliance will be eliminated when two or more test failures occur and test failures meeting substantial compliance will be subject to the next higher price reduction. One sieve failure = one test failure. Test failures for each material type will be treated separately.

S-45.10 The following is added to Table 2211-D in MnDOT 2211.3F2 Acceptance Testing:

Substantial compliance will be applied to no more than one test failure. Substantial compliance will be eliminated when two or more test failures occur and test failures meeting substantial compliance will be subject to the next higher price reduction. Test failures for each material type will be treated separately.

S-45.11 The Class 5 base material shall be placed, compacted, and cut to final grade at least seven (7) days in advance of the start of the bituminous surfacing. Class 7 material will not be allowed for aggregate base unless previously approved by the Engineer.

S-45.12 Each aggregate source (Add-Rock) will meet the Aggregate (Quality Tests), Specification 3138 requirements as its own product sample, not as a combined/composite sample with other aggregates.

S-46 (2211) AGGREGATE BASE CL-2(M) - MODIFIED

S-46.1 The Class 2 Aggregate Base Modified shall conform to the requirements of 3138 modified to require that 100 percent shall pass the 1 1/2" screen and that not more than 25 percent shall pass the 3/4" screen.

S-46.2 The Class 2 Aggregate Base Modified shall be placed with a paver.

S-46.3 MNDOT Standard Specification for Construction 3138.2.D Los Angeles Rattler Loss is revised for Class 2 Modified to allow 45% Maximum Los Angeles Rattler Loss, or as directed by the Engineer

S-47 (2301) CONCRETE PAVEMENT

(2012 version (Rev. 1/20/12))
SP2005-111

MnDOT 2301 shall be deleted and replaced with the following:

2301.1 DESCRIPTION

This work consists of constructing portland cement concrete pavement on a prepared base.

The Department defines paving concrete to include concrete mainline, ramps, loops, integrant curb, shoulders, and curb and gutter placed adjacent to the concrete mainline with the same mixture used in the paving. Integrant curb is a curb constructed monolithically with the pavement.

For the purposes of concrete pavement, the Department defines a concrete plant as the following:

(1) A paving plant using dump or agitator trucks to haul concrete, or
(2) A certified ready-mix plant using truck mixers to haul concrete.

For concrete pavement incentives and disincentives, the Department defines a concrete plant as the following:

(1) A primary concrete plant providing the majority of the concrete to a paving project, and
(2) A secondary concrete plant providing any minor work or fill-ins not provided by the primary concrete plant.

Only one primary concrete plant per project is allowed unless otherwise approved by the Engineer. The Contractor may use a paving plant or a certified ready-mix plant as the primary concrete plant.

2301.2 MATERIALS

A Concrete 2461

A.1 Slipform Placement ..... Mix No. 3A21

A.2 Fixed Form Placement ..... Mix No. 3A41

B Coarse and Fine Aggregate Requirements

Test each aggregate fraction proposed for use in accordance with Table 2301-1:

Table 2301-1 Aggregate Testing Requirements	
Aggregate	Testing Required
Tested by Department in the last 3 years	No additional testing *
Not tested by the Department in the last 3 years	Preliminary aggregate testing in accordance with 2301.3.B.1
New source	New source concrete aggregate testing in accordance with 3126 and 3137
* Perform additional testing as required by the Engineer in conjunction with the Concrete Engineer.	

B.1 Required Preliminary Aggregate Testing

After the Department awards the Contract and as soon as coarse and fine aggregates are available for testing, contact the Engineer to coordinate preliminary sampling of aggregate for concrete paving. The Engineer in conjunction with the Concrete Engineer will sample and test the aggregate to verify specific gravity, absorption data, and aggregate quality. The Department will perform other tests as determined necessary by the Engineer in conjunction with the Concrete Engineer.

B.2 Aggregate Alkali Silica Reactivity (ASR) Requirements for Concrete Mixes

The Department will test the designated fine aggregate for alkali silica reactivity (ASR) with Holcim, St. Genevieve, Type I/II portland cement and Lafarge, Davenport, Type I/II portland cement in accordance with ASTM C 1260 MnDOT Modified. If the fine aggregate contains an intermediate size aggregate such as "buckshot" or "pearock" as determined by the Concrete Engineer, the Department will perform testing in accordance with ASTM C 1260.

The Concrete Engineer, in coordination with the Engineer, will review the 14-day fine aggregate expansion test results to determine the acceptability of the proposed fine aggregate and cement combination in accordance with the 14-day fine aggregate expansion limits in Table 2301-2.

Table 2301-2 Fine Aggregate ASR Mitigation Requirements	
14-day Fine Aggregate Expansion Limits	
≤ 0.150	The Department will accept the fine aggregate with or without a mitigator
$> 0.150 - 0.250$	Mitigate the fine aggregate with 35 percent ground granulated blast furnace slag or at least 20 percent fly ash
$> 0.250 - 0.300$	Mitigate the fine aggregate with 35 percent ground granulated blast furnace slag or 30 percent fly ash in accordance with 3115, modified with at least 66.0 percent $SiO_2 + Fe_2O_3 + Al_2O_3$ on a dry weight basis and at least 38.0 percent SiO_2
> 0.300	The Department will reject the fine aggregate

For fine aggregate and cement combinations previously tested by the Department, the Concrete Engineer will use the previous test results to determine necessary mitigation. The Contractor may contact the Department to access the list of previously tested fine aggregate sources.

If the fine aggregate and cement combination were not previously tested, the Concrete Engineer will use the higher expansion result of the two fine aggregate and cement combinations to determine necessary mitigation.

Add "buckshot" or "pea rock as a separate aggregate in accordance with the quality requirements of 3137, except the Department will determine the shale content in accordance with AASHTO T 113 MnDOT Modified, "Lightweight Pieces in Aggregate" fine aggregate procedure. If this aggregate is from the same source as the ¾ in+ [19 mm+] or ¾ in– [19 mm–] aggregate, the Concrete Engineer will waive the requirements specified in 3137.2D3(c), "Carbonate in Class C aggregate by weight.". If this aggregate is from sources other than the ¾ in+ [19 mm+] or ¾ in– [19 mm–] aggregate, approval is at the discretion of the Concrete Engineer.

The Concrete Engineer may reject the fine aggregate if mortar bar specimens exhibit an indication of external or internal distress not represented by the expansion results. The Concrete Engineer will make the final acceptance of the aggregate.

C Cementitious Materials

Design the concrete paving mixes in accordance with the following requirements for cementitious material:

(1) Total alkalis no greater than 0.60 percent in the portland cement ($Na_2O + 0.658\ K_2O$)
(2) Total alkalis no greater than 5.0 lb per cu. yd [3.0 kg per cu.m] in the combined cementitious material
(3) At least 530 lb per cu. yd [315 kg per cu. m] minimum cementitious,
(4) At least 400 lb per cu. yd [237 kg per cu. m] of portland cement when using fly ash or at least 385 lb per cu. yd [228 kg per cu. m] when using slag as a portland cement replacement,
(5) Provide additional cementitious material to meet requirements in accordance with this section at no additional cost to the Department,
(6) Total cementitious material no greater than 600 lb per cu. yd [356 kg per cu. m] except for high-early strength mixes.

The Department defines high-early strength concrete as concrete with a cementitious content of greater than 600 lb per cu. yd [356 kg per cu. m].

The Contractor may use 100 percent portland cement for the cementitious material for high-early mixes, except if using quartzite or gneiss coarse aggregate provide high-early mixes in accordance with 2301.2.C.1.

C.1 Special Cementitious Requirements for Quartzite and Gneiss

If providing coarse aggregate from sources identified by the Department as quartzite or gneiss and if the coarse aggregate does not meet the 0.04 percent expansion limit when tested in accordance with ASTM C 1293, replace the portland cement with the following:

(1) 30 percent of a MnDOT certified fly ash from the Approved Products list in accordance with 3115, except provide fly ash in the concrete mixture with at least 66 percent $Si0_2 + Fe_2O_3 + Al_2O_3$ on a dry weight basis for at least 12 consecutive months and at least 38 percent $Si0_2$ content, or
(2) 35 percent of a MnDOT certified ground granulated blast furnace slag from the Approved Products list.

D Concrete Mix Design Requirements

Design the concrete mix based on an absolute volume of 27.00 cu. ft ± 0.10 cu. ft [1.000 cu. m ± 0.003 cu. m] in accordance with the following:

(1) Fine aggregates complying with the requirements of Specification 3126 for aggregate quality.
(2) Coarse aggregates complying with the requirements of Specification 3137 for aggregate quality.
(3) Air content of 7.0 percent plus or minus 1.5 percent at the point of placement.
(4) High-early concrete placed at a water-cementitious ratio not greater than 0.38.

Submit the concrete mixes utilizing the MnDOT Contractor Mix Design Submittal Worksheet available on the Department's website at least 21 calendar days before the initial placement of concrete using the concrete mix design. For mix design calculations, the Engineer, in conjunction with the Concrete Engineer, will provide specific gravity and absorption data.

The Concrete Engineer, in coordination with the Engineer, will review the mix design submittal and approve the materials and mix design for compliance with the Contract.

The Contractor assumes full responsibility for the mix design and performance of the concrete.

The Engineer determines final acceptance of concrete for payment based on satisfactory field placement and performance.

D.1 Concrete Pavement < 3,500 cu. yd. [2,900 cu. m]

If the estimated quantity of concrete pavement in the Contract is less than 3,500 cu. yd. (2,900 cu. m.), calculated by multiplying the planned pavement area by the planned pavement thickness, provide a mix design meeting the following requirements:

(1) Grade A paving concrete placed at a water/cement ratio not greater than 0.42.
(2) Provide a fine aggregate gradation complying with Table 3126-3.
(3) Provide either a CA-15, CA-35, or CA-50 coarse aggregate gradation complying with the requirements of Table 3137-4.
(4) In lieu of (2) and (3) above, provide a Job Mix Formula in accordance with 2301.2.D.3.
(5) Specification 2301.2.D.4 incentive/disincentives for aggregate quality, well-graded aggregate and w/c ratio shall not apply.

D.2 Concrete Pavement ≥ 3,500 cu. yd. [2,900 cu. m]

If the estimated quantity of concrete pavement in the Contract is at least 3,500 cu. yd. [2,900 cu. m], calculated by multiplying the planned pavement area by the planned pavement thickness, provide a mix design meeting the following requirements:

(1) Grade A paving concrete placed at a water/cement ratio not greater than 0.40.
(2) Submit a Job Mix Formula in accordance with 2301.2.D.3.
(3) For concrete produced at a secondary concrete plant or as otherwise allowed by the Engineer, the Contractor has the option to design a mix in accordance with 2301.2.D.1.
(4) Specification 2301.2.D.4 incentive/disincentives for aggregate quality, well-graded aggregate and w/c ratio apply.

D.3 Job Mix Formula

Use at least two fractions of coarse aggregate that include the ¾ in+ [19 mm+] and ¾ in– [19 mm–] fractions.

A Job Mix Formula (JMF) contains proportions of materials and individual gradations of each material plus a composite gradation. The Engineer will base the JMF on the combination of coarse and fine

aggregate in accordance with Table 2301-3. The Department will waive the gradation requirements of 3126 and 3137.

Table 2301-3
Job Mix Formula Working Range

Sieve Sizes	Working Range, %*
2 in [50 mm]	±5
1½ in [37.5 mm]	±5
1 in [25 mm]	±5
¾ in [19 mm]	±5
½ in [12.5 mm]	±5
⅜ in [9.5 mm]	±5
No.4 [4.75 mm]	±5
No.8 [2.36 mm]	±4
No.16 [1.18 mm]	±4
No.30 [600 µm]	±4
No.50 [300 µm]	±3
No.100 [150 µm]	±2
No.200 [75 µm]	≤ 1.6

* Working range limits of the composite gradation based on a moving average of 4 tests (N=4).

Add fill-in sieves as needed during the testing process to prevent overloading. Provide combined aggregates with 100 percent passing the 2 in [50 mm] sieve and no greater than 1.6 percent passing the No. 200 [75 µm] sieve. In addition, each coarse aggregate fraction must comply with the Material Passing the No. 200 [75 µm] sieve requirement in 3137.2.D.1.i.

Include working ranges based on the composite gradation of the sieves specified in Table 2301-3 with the JMF submittal.

Take samples at the belt leading to the weigh hopper or other locations close to the incorporation of the work as approved by the Engineer. The Engineer will determine the sampling location by using a random number chart and multiplying the random number by the sampling rate as defined in the Schedule of Materials Control. Test, and record the individual results.

The Engineer will randomly verify Contractor combined aggregate gradation results as defined in the Schedule of Materials Control.

If the quantities of concrete produced results in no gradation testing for any given day, include the untested quantity of concrete into the next day's production and include that quantity of concrete in the sampling rate. If the untested quantity is on the last day of production, add that quantity to the previous day's production.

D.3.a JMF Adjustments

If, during production, the moving average of QC aggregate gradation tests falls outside the allowable JMF working range, make adjustments within the limits specified in Table 2301-4 without submitting a new mix design as approved by the Engineer.

Table 2301-4
Allowable JMF Adjustments

Sieve Size	Allowable Adjustment, %
≥ No. 4 [4.75 mm]	±5
No. 8 [2.36 mm] – No.30 [600 µm]	±4
No. 50 [300 µm]	±3

Table 2301-4 Allowable JMF Adjustments	
Sieve Size	Allowable Adjustment, %
No. 100 [150 µm]	±2

The Contractor may continue paving after submitting a new JMF with working range and aggregate volume adjustments to the Engineer. Submit all JMF adjustments on the MnDOT JMF Adjustments Worksheet available from the Department's website.

If the moving average of four tests falls outside of the adjusted allowable working range, stop production and provide a new mix design including JMF as directed by the Engineer in conjunction with the Concrete Engineer.

D.4 Concrete Pavement Incentives and Disincentives

The Department shall apply concrete mix incentives and disincentives for Contracts using at least 3,500 cu. yd [2,900 cu. m] of concrete, calculated by multiplying the planned pavement area by the planned pavement thickness, of paving concrete.

The Department will only apply coarse aggregate quality incentives or disincentives for materials provided or produced by the Contractor's primary concrete plant.

The Department will not provide water/cement ratio incentive payments for high-early mixes. The Department will only apply water/cement incentives or disincentives for concrete hauled in dump trucks, agitator trucks, or both.

If the Contractor adds water to the pavement surface without approval by the Engineer, the Department will not pay water/cement or ride incentives on sections where the water is added and the Engineer may reject the pavement in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work."

D.4.a Coarse Aggregate Quality Incentive/Disincentive

The Engineer will accept the coarse aggregate for paving concrete by statistical methods and in accordance with all other aggregate quality requirements of 2301, 2461, and 3137.

The Coarse Aggregate Quality Incentive/Disincentive for CLASS B and CLASS C Aggregates will comply with the following:

The Engineer will take samples at the belt leading to the weigh hopper or other locations close to the incorporation of the work as approved by the Engineer. The Engineer will take samples in accordance with Table 2301-5:

Table 2301-5 Coarse Aggregate Quality Incentive/Disincentive Sampling Rates	
Plan Concrete, cu. yd [cu. m]	Samples per Fraction (n)
3,500 – 7,500 [2,900 – 6,250]	3
7,501 – 10,000 [6,251 – 8,500]	5
10,001 – 25,000 [8,501 – 21,000]	10
25,001 – 50,000 [21,001 – 42,000]	15
50,001+ [42,001+]	20

The Engineer will consider the entire Project as a single lot for each of the two fractions containing the highest percentage by weight. If the Project is planned for construction over multiple years

and prior to placing any concrete pavement, the Contractor shall request the Engineer calculate the incentive/disincentive payment on a yearly basis. The Engineer, in conjunction with the Concrete Engineer, will modify the sampling and testing rates as necessary.

The Engineer will establish a new statistical family for each change in aggregate source, fraction, or both.

The Engineer will randomly choose the acceptance samples.

The Engineer will divide a lot representing the Plan cubic yards [cubic meters] of concrete by the number of samples to form sublots. The Engineer will multiply the number of cubic yards [cubic meters] in a sublot by a random number to obtain the position in the sublot for the sample. The Engineer will split the samples and leave half of the sample for the Contractor. The Engineer's laboratory will test the samples and report the individual results. The Engineer will calculate a Quality Index (QI) for each fraction in accordance with the following:

$$QI = X + k(s)$$

Where:

$$\text{X} = \text{mean} = \sum \frac{X_i}{n}$$

X_i = individual test results

$$\text{s} = \text{standard deviation} = \sqrt{\sum \frac{(x_i - x)^2}{(n-1)}}$$

k = Adjustment Factor based on the number of tests as shown in Table 2301-6:

Table 2301-6
Adjustment Factor "k"

k	No. of Tests
1.09	3
1.23	5
1.26	10
1.27	≥ 15

If Class A, Class B, and Class C aggregates meet the requirements as determined by the Engineer, the Department will provide payment based on a per fraction incentive in accordance with Table 2301-7.

Table 2301-7 Coarse Aggregate Quality Incentive/Disincentive		
Aggregate Class	QI for Fraction, %	Structural Concrete per cu. yd [cu. m] Payment Change per Fraction
Class A (including quartzite and gneiss)	—	$1.00 [$1.30]
Class B (based on % absorption)	≤1.00	$1.00 [$1.30]
	1.01 – 1.45	$0.50 [$0.65]
	1.46 – 1.76	$0.00
	1.77 – 1.85	-$1.00 [$1.30]
	≥ 1.86	As recommended by the Concrete Engineer, with coordination of the Engineer
Class C (based on % carbonate)	≤ 15.0	$1.00 [$1.30]
	15.1 – 24.0	$0.50 [$0.65]
	24.1 – 31.0	$0.00
	31.1 – 35.0	-$1.00 [$1.30]
	≥ 35.1	As recommended by the Concrete Engineer, with coordination of the Engineer

The Department will not pay incentives or disincentives for Class R aggregates.

If the concrete mixture contains at least three fractions of coarse aggregate, the Engineer will consider only the two containing the highest percentage by weight as eligible for incentive. The Contractor may combine at least two sub-fractions to form the ¾ in – [19 mm –] fraction for either the coarse or fine fraction of the coarse aggregate. Blend the sub-fractions by weight. The Engineer will base the maximum incentive for aggregate quality on the two largest fractions by weight.

The Department will pay for Coarse Aggregate Quality Incentive/Disincentive for all paving concrete, including water/cement ratio concrete, and high-early concrete provided by the Contractor's primary paving plant.

D.4.b Water/Cement (w/c) Ratio

Provide and place concrete with a water/cement ratio not to exceed 0.40. Make any adjustments immediately when the water/cement ratio exceeds 0.40.

The Department will not make incentive payments for water/cement ratio on high-early mixes.

Do not add water to the surface of the concrete to aid in finishing without the approval of the Engineer. Supply sufficient trucks to ensure a steady forward progress of the paver.

The Department will determine the water/cement ratio for concrete hauled in dump or agitator trucks (concrete hauled in truck mixers are not eligible for w/c ratio incentives) in accordance with the following:

D.4.b(1) Water Content Determination

For a concrete paving batch plant, use an electronic meter approved by the Engineer to record the water, including temper water, added to the mix that is capable of printing the amount of total water on each batch ticket.

For a ready-mix plant, record the total water added to the mix, including temper water, on the computerized Certificate of Compliance.

The Engineer will determine the water content for calculating the water/cement ratio using the average water calculated from 10 batch tickets or Certificates of Compliances surrounding the randomly selected batch ticket sample (four previous tickets, ticket representing the random sample, and the five following tickets).

D.4.b(2) Water Content Verification

The Engineer will use plastic concrete taken at the plant site to verify the water content in the mix as determined in accordance with 2301.2.D.4.b.(1), "Water Content Determination." The Contractor will sample the plastic concrete as directed by the Engineer.

The Engineer will verify the water content in the plastic concrete mixture using the test procedure specified in AASHTO T 318-02, "Standard Test Method for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying." The Engineer will begin the test within 45 min after the water has contacted the cement. Provide the microwave oven and the ancillary equipment as required by the Engineer to perform this test.

D.4.b(3) Cementitious Content Determination

The Engineer will determine the cementitious content for calculating the water/cement ratio using the average total cementitious calculated from 10 batch tickets or Certificates of Compliances surrounding the randomly selected batch ticket sample (four previous tickets, ticket representing the random sample, and the five following tickets).

D.4.b(4) W/C Ratio Incentive/Disincentive

The Engineer will base the statistical analysis of acceptance for water/cement ratio in accordance with with 2301.2.D.4.b(1), "Water Content Determination," and 2301.3.D.4.b(3), "Cementitious Content Determination," at a rate defined in the Schedule of Materials Control.

The Engineer will randomly choose acceptance samples. The Engineer will determine the sampling location by using a random number chart and multiplying the random number by the sampling rate as defined in the Schedule of Materials Control.

The Engineer will sample, test, and record the individual results.

If the quantities of concrete produced results in no Agency moisture testing for any given day, include the untested quantity of concrete into the next day's production and include that quantity of concrete in the sampling rate. If the untested quantity is on the last day of production, add that quantity to the previous day's production.

Do not place concrete mix not meeting the 0.40 water/cement ratio requirement in the work. The Engineer may accept material not meeting the Contract requirements and the Department will pay for the work in accordance with Table 2301-8.

Table 2301-8 W/C Ratio Incentive/Disincentive	
W/C Ratio Test Result	Payment incentive/disincentive per cu. yard [cu. m]
≤ 0.37	+$3.00 [$3.90]
0.38	+$1.75 [$2.25]
0.39	$0.50 [$0.65]
0.40	$0.00
0.41	-$0.50 [$0.65]
0.42	-$1.75 [-$2.25]
0.43	-$3.00 [-$3.90]
≥ 0.44	Determined by the Concrete Engineer

The Contractor may remove and replace concrete represented by water/cement ratios greater than 0.40. For concrete left in place with water/cement ratios greater than 0.40, if the level of payment is not defined in the table, the Engineer in conjunction with the Concrete Engineer, will evaluate the material based on the adequacy of the material for the use intended. Remove and replace unsatisfactory concrete as determined by the Engineer at no additional cost to the Department.

D.4.c Well-Graded Aggregate Optional Incentive

The Engineer will use the Contractor's combined aggregate gradation test results, as verified by Department testing, to determine eligibility for the incentive.

The Contractor has two well-graded aggregate optional incentives available as follows:

(1) Percent Retained Gradation Band in accordance with Table 2301-9.

TABLE 2301-9 8-18 or 7-18 Percent Retained Gradation Band		
Sieve Sizes	8-18 % Retained	7-18 % Retained
2 inch [50 mm]	0%	0%
1 ½ inch [37.5 mm]	≤9%	≤9%
1 inch [25 mm]	8% to 18%	7% to 18%
¾ inch [19 mm	8% to 18%	7% to 18%
½ inch [12.5 mm]	8% to 18%	7% to 18%
3/8 inch [9.5 mm]	8% to 18%	7% to 18%
#4 [4.75 mm]	8% to 18%	7% to 18%
#8 [2.36 mm]	8% to 18%	7% to 18%
#16 [1.18 mm]	8% to 18%	7% to 18%
#30 [600 µm]	8% to 18%	7% to 18%
#50 [300 µm]	≤ 13%	≤ 13%
#100 [150 µm]	≤8%	≤8%
#200 [75 µm]	≤8%	≤8%

(2) Gradation Zone II-A of the Coarseness Factor Chart in accordance with Table 2301-10.

TABLE 2301-10 Coarseness Factor Boundaries – Zone II-A	
Coarseness Factor (CF)	Workability Factor (WF)
52	34 - 38
68	32 - 36
The Coarseness Factor (CF) is defined as follows: $CF = \frac{\text{Combined \% retained above 3/8 in [9.5 mm] sieve}}{\text{Combined \% retained above No.8 [2.36 mm] sieve}} \times 100$	The Workability Factor (WF) is defined as follows: WF = Combined % passing No. 8 [2.36 mm] sieve

The Engineer will use statistical analysis of the Contractor's combined aggregate gradation samples for well-graded aggregate on a lot basis representing one day's paving. The lot will represent the cumulative average of the sublot values on each sieve for the gradation band or the cumulative average of the sublot values of the coarseness factor and workability factor for the coarseness factor chart.

An optional incentive is available to the Contractor provided a concrete mixture is designed and produced with a well-graded aggregate gradation that meets one of the following in accordance with Table 2301-11. The Contractor may achieve only one of the optional incentives for any single lot.

TABLE 2301-11 Well-Graded Aggregate Optional Incentive	
Gradation Options	Payment incentive/disincentive per cu. yard [cu. m]
8-18 Retained	\$2.00 per cubic yard (\$2.60 per m^3)
7-18 Retained	\$0.50 per cubic yard (\$0.65/m^3)
Gradation Zone II-A	\$2.00 per cubic yard (\$2.60 per m^3)

The Engineer will use the Contractor's combined aggregate gradation test results, as verified by Department testing, to determine compliance.

E Reinforcement Bars 3301

F Dowel Bars 3302

G Concrete Joint Sealers

G.1 Preformed Type 3721

G.2 Hot-poured, Elastic Type 3725

G.3 Silicone Type 3722

H Preformed Joint Filler 3702

I Curing Materials

I.1 Burlap Curing Blankets 3751

I.2 Poly-Alpha Methylstyrene (AMS) Membrane Curing Compound 3754

I.3 Linseed Oil Membrane Curing Compound 3755

I.4 Plastic Curing Blankets 3756

J Form Coating Material 3902

2301.3 CONSTRUCTION REQUIREMENTS

Use "slipform" as the standard construction method for concrete paving, unless otherwise specified in the Contract or allowed by the Engineer.

A.1 High-Early Strength Sections

For early use of the pavement as required by the Engineer, construct a section of pavement of high-early strength concrete in accordance with 2301.2.D, "Concrete Mix Design Requirements" at important road crossings, intersections, driveway entrances, or other locations as shown on the Plans or directed by the Engineer. Take precautions to satisfactorily finish, cure, and protect high-early strength concrete pavements.

A.2 Operation and Supervision

Notify the Engineer at least 24 h before placing concrete to allow for inspection. Do not place concrete until the Engineer approves preparations for concrete placement. If the Contractor fails to notify the Engineer at least 24 h before concrete placement, the Engineer may not allow concrete placement in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work."

Provide paving operations supervision in accordance with 1506, "Supervision by Contractor." Provide an organizational chart listing names and phone numbers of individuals and alternates responsible for mix design, quality control administration, and inspection to the Engineer. Post the organizational chart in the Contractor's on-site facility.

Provide a manufacturer's manual explaining the operation and adjustments of the major pieces of power operated equipment used.

A.3 Plant Certification

Provide notice 16 hrs in advance of concrete paving production and in conjunction with the Engineer, perform a thorough on-site inspection of the concrete plant and complete MnDOT Form 2164, "Concrete Paving Plant Contact Report." Sign the report to certify compliance with the paving requirements and to certify review of the continual maintenance of the plant.

Calibrate and correlate the testing equipment in accordance with 2461.

A.3.a Combination Plant Lab – Office Requirements

The Concrete Paving Contractor QC technicians and the Department QA technicians will equally share a combination plant lab – office during concrete paving.

For concrete paving projects in accordance with 2301.2.D.2, provide a separate combination plant lab – office in accordance with 1604, "Plant Inspection – Commercial Facility," except as modified by the following characteristics and requirements:

(1) Located at the plant site within 100 yd [91 m] from the batch plant or other location, as approved by the Engineer,
(2) Plant lab and plant office areas separated and isolated by a wall,

(3) Total plant lab-office floor area, based on exterior dimensions, of at least 224 sq. ft [21 sq. m],
(4) Plant lab floor area, based on exterior dimensions, of at least 144 sq. ft [13.5 sq. m],
(5) Plant office floor area, based on exterior dimensions, of at least 80 sq. ft [7.5 sq. m],
(6) Heating and cooling system capable of maintaining a uniform temperature between 72° and 85° F [22° and 29° C],
(7) Drinking water container or cooler with adequate supply of potable water,
(8) Detached portable toilet conveniently located,
(9) Electrical power supply that provides adequate amperage for all electrical needs,
(10) Water supply (storage tank with a capacity of 50 gal or more, or pressurized water supply) connected to the sink faucet,
(11) Provide a sample storage area to prevent contamination of the samples,
(12) Plant lab furnished in accordance with the following:
  (12.1) One sturdily built workbench or countertop at least 30 in × 144 in [0.75 m × 3.65 m],
  (12.2) One service sink located near one end of the workbench with a water supply, faucet and an outside drain,
  (12.3) Shelf space above workbench or countertop or at other convenient locations, totaling at least 8 linear ft [2.5 m] × 8 in [0.2 m],
  (12.4) Electronic scales of sufficient size to weigh the samples for all required materials testing, and
  (12.5) A four burner 30" standard electric stove top or stove and at least two additional electric burners to perform required aggregate testing per the Schedule of Materials Control.
  (12.6) Microwave oven with turntable or wave deflection fan (900 Watt), heat resistant glass pan (approx. 9"x9"x2"), plain weave fiberglass cloth (10 oz/yd^2 and 14 mills thick), metal scrapper and grinding pestle,
  (12.7) Metal bowls of sufficient size to perform all required material testing,
(13) Plant office furnished in accordance with the following:
  (13.1) Two desks, one for the Department and one for the Contractor, with total exterior dimensions of at least 30 in × 60 in [¾ m × 1.50 m],
  (13.2) At least four (4) chairs,
  (13.3 A telephone capable of providing email, and
  (13.4) A printer with scanning and copying capabilities.

For concrete paving projects supplied by a Certified Ready-Mix Plant, the separate Combination Plant - Lab Office requirements of 2301.2.A.3.a do not apply with the exception of the following:

(1) Electrical power supply that provides adequate amperage for all electrical needs,
(2) Water supply (storage tank with a capacity of 50 gal or more, or pressurized water supply) connected to the sink faucet,
(3) Electronic scales of sufficient size to weigh the samples for all required materials testing, and
(4) At least six (6) electric burners to perform required aggregate testing per the Schedule of Materials Control.
(5) Metal bowls of sufficient size to perform all required material testing,
(6) If w/c incentives apply, provide a microwave oven with turntable or wave deflection fan (900 Watt), heat resistant glass pan (approx. 9"x9"x2"), plain weave fiberglass cloth (10 oz/yd^2 and 14 mills thick), metal scrapper and grinding pestle,

Do not begin concrete paving operations until the Engineer approves the combination plant lab–office. The Contract square yard [square meter] price for *Concrete Pavement* includes the cost of the plant lab-office.

A.4 Sampling and Testing

Provide a MnDOT Certified Concrete Plant Level 2 Technician to oversee testing and plant operations and to remain on-site during concrete production or have cellular phone availability.

Provide technicians with certification at least meeting MnDOT Concrete Plant Level 1 to perform all of the duties in accordance with the MnDOT Concrete Manual. The Engineer will provide technicians with certification at least meeting MnDOT Concrete Plant Level 1 to perform all of the duties in accordance with the MnDOT Concrete Manual.

Performs testing in accordance with the MnDOT Concrete Manual and determines testing rates meeting the requirements of the Schedule of Materials Control. The Engineer performs testing in accordance with the MnDOT Concrete Manual and determines testing rates meeting the requirements of the Schedule of Materials Control.

Take samples randomly using ASTM D 3665, Section 5.

Take samples in accordance with the 2011 Schedule of Materials Control except as modified in the following tables below:

<table>
<tr><th colspan="8">Concrete Pavement - Concrete Plant Production</th></tr>
<tr><th>Pay Item No.</th><th>Test Type</th><th>Spec. No.</th><th colspan="2">Producer/Contractor Testing</th><th colspan="2">Agency Testing</th><th>Form No.</th></tr>
<tr><td rowspan="3">2301</td><td rowspan="3">Gradation Testing (QC/QA) (5-694.145 and 5-694.148)</td><td rowspan="3">3126
3137</td><td><u>For a concrete paving batch plant:</u>

1 per 1200 m^3 (1500 yd^3) or completed 1 per ½ day, whichever results in the highest sampling rate.</td><td><u>For a certified ready-mix plant:</u>

1 per 400 m^3 (yd^3) or completed every 4 hours, whichever results in the highest sampling rate.</td><td colspan="2">Test the first 4 QA samples of production each time the Contractor mobilizes the plant or changes aggregate sources.</td><td rowspan="3">21764 Concrete Aggregate Worksheet JMF

Well-graded Concrete Aggregate Worksheet</td></tr>
<tr><td colspan="2"><u>For a concrete paving batch plant:</u>

1 per day on randomly selected samples thereafter.</td><td><u>For a certified ready-mix plant:</u>

1 per 1000 m^3 (1000 yd^3) or 1 per week, whichever results in highest sampling rate on randomly selected samples thereafter.</td></tr>
<tr><td colspan="2">Performing testing on representative material at the end of the most recent day of production is allowed.

If well-graded aggregate incentives apply: Use the Contractor's gradation results for well-graded aggregate incentive calculations as verified by Agency testing</td><td colspan="2">Identify the gradation samples with "QA Gradation" on the Sample ID Card and include the JMF Number and the QC Gradation results.

If Coarse Aggregate Quality Incentive/Disincentives apply: The Agency may also use the QA gradation sample for the Coarse Aggregate Quality incentive/disincentive testing. In this case, notify the Producer/Contractor to double the QC/QA gradation sample size.</td></tr>
</table>

<table>
<tr><th colspan="7">Concrete Pavement - Concrete Plant Production</th></tr>
<tr><th>Pay Item No.</th><th>Test Type</th><th>Spec. No.</th><th colspan="2">Producer/Contractor Testing</th><th colspan="2">Agency Testing</th><th>Form No.</th></tr>
<tr><td rowspan="2">2301</td><td>Coarse Aggregate Testing on -75 µm (#200) (QC/QA) (5-694.146)</td><td>3137</td><td colspan="2">Starting on the first day of production and each time the Contractor mobilizes the plant, changes aggregate sources, or the cleanliness of the coarse aggregate is in question: test the first sample and then at least 1 of the next 3 samples.

1 test per day thereafter

Test these samples at the plant.</td><td colspan="2">1 randomly selected sample on the first day of production and each time the Contractor mobilizes the plant, changes aggregate sources, or the cleanliness of the coarse aggregate is in question.

Test these samples at the plant.</td><td>21764 Concrete Aggregate Worksheet JMF</td></tr>
<tr><td colspan="2"><u>For a concrete paving batch plant:</u>
1 test per week thereafter</td><td><u>For a certified ready-mix plant:</u>
1 per 1000 m^3 (1000 yd^3) or 1 per week, whichever results in highest sampling rate on randomly selected samples thereafter.</td><td></td></tr>
<tr><td>Aggregate Moisture Testing (QC/Verification) (5-694.142)</td><td></td><td><u>For a concrete paving batch plant:</u>

If w/c incentives do not apply:
1 per 750 m^3 (1000 yd^3) or completed every 4 hours, whichever results in the highest sampling rate.</td><td><u>For a certified ready-mix plant:</u>

If w/c incentives do not apply:
1 per 200 m^3 (200 yd^3) or completed every 4 hours, whichever results in the highest sampling rate</td><td><u>For a concrete paving batch plant:</u>

If w/c incentives apply:
1 per 750 m^3 (1000 yd^3) or completed every 4 hours, whichever results in the highest sampling rate.

Take initial samples for aggregate moisture testing within the first 175 m^3 (250 yd^3).</td><td><u>For a certified ready-mix plant:</u>

If w/c incentives apply:
1 per 200 m^3 (200 yd^3) or completed every 4 hours, whichever results in the highest sampling rate.

Take initial samples for aggregate moisture testing within the first 75 m^3 (100 yd^3).</td><td>Concrete W/C Ratio Calculation Worksheet</td></tr>
</table>

<table>
<tr><th colspan="6">Concrete Pavement - Concrete Plant Production</th></tr>
<tr><th>Pay Item No.</th><th>Test Type</th><th>Spec. No.</th><th>Producer/Contractor Testing</th><th colspan="2">Agency Testing</th><th>Form No.</th></tr>
<tr><td></td><td>Aggregate Moisture Testing (QC/Verification) (5-694.142)

CONTINUED FROM PREVIOUS PAGE</td><td></td><td>Complete the initial moisture content and adjust the batch water prior to the start of concrete production each day.

If weather conditions allow, performing moisture testing on representative material at the end of production the prior evening is allowed.</td><td colspan="2">If w/c incentives apply:
Use aggregate moisture results for determining the water content to calculate the w/c ratio incentive/disincentive.

Do not leave samples unattended.</td><td></td></tr>
<tr><td>2301</td><td>Water Content Verification Testing (Microwave Oven Verification) (5-694.532)</td><td>2301</td><td>Obtain the plastic concrete sample at the plant.</td><td colspan="2">If w/c incentives apply:
Microwave oven verification testing to verify the w/c ratio is completed in conjunction with Agency aggregate moisture testing.

Do not leave samples unattended.</td><td>Concrete W/C Ratio Calculation Worksheet</td></tr>
<tr><td></td><td></td><td></td><td></td><td><u>For a concrete paving batch plant:</u>

Take initial sample for microwave oven verification testing within the first 175 m^3 (250 yd^3). At least one additional verification test should be taken if more than 750 m^3 (1000 yd^3) is produced in a day.</td><td><u>For a certified ready-mix plant:</u>

Take initial sample for microwave oven verification testing within the first 75 m^3 (100 yd^3). At least one additional verification test should be taken if more than 400 m^3 (400 yd^3) is produced in a day.</td><td></td></tr>
</table>

A.5 Contractor Charting

Maintain and keep control charts current. Provide and display easily readable sized charts on the testing facility wall or store in a 3-ring binder. Plot the following information on control charts using a method approved by the Engineer:

(1) Composite gradation,
(2) Air content (QC and QA),
(3) Moisture content of aggregates, and
(4) Water/cement ratio.

Also include the following information on the charts:

(1) Date,
(2) Time,
(3) Lot and sublot,
(4) Admixture dosage adjustments, and
(5) Other data necessary to facilitate control of the process.

Provide all reports, records, and diaries developed during the progress of construction activities to the Engineer. Provide all batch tickets and test results to the Engineer on a daily basis. The Engineer may suspend plant operations if the Contractor fails to provide daily test results.

A.6 MIT-SCAN T2 Non-Destructive Testing Device

The Contractor shall furnish a MIT-SCAN T2 non-destructive testing device having the ability to measure the location of concrete reinforcement, dowel bars and concrete pavement thickness in a single device. Agency and Contractor personnel shall mutually use this non-destructive testing device several times a day during concrete pavement construction. Agency observations do not relieve the Contractor of the requirement to properly place the concrete reinforcement and dowel bars as shown in the plans. In addition, the Department reserves the right to reject the pavement in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work."

The Engineer will not provide additional payment for furnishing the above equipment for the Department's use.

B Subgrade and Aggregate Base Preparations

Prepare the subgrade and aggregate base in accordance with 2112 and 2211 and the following:

Fine grade the aggregate base to the required shape and grade as shown in the plans, allowing construction of the pavement to the specified thickness and cross section as shown in the plans. Use an approved fine grading machine mounted on crawler tracks.

Shape and maintain the shoulders to allow surface water to drain away from the pavement and off the shoulders.

C Setting Forms

Provide forms meeting the following requirements and characteristics:

(1) Steel, straight edge sides,
(2) Depth equal to the specified pavement thickness,
(3) Smooth and free of localized indentations and deformities,
(4) Top face with deviations no greater than ⅛ in [3 mm] in any 10 ft [3 m] section,
(5) Faces of straight forms with deviations no greater than ¼ in [13 mm] in any 10 ft [3 m] section,
(6) Side forms containing no bends or damaged sides,
(7) Forms containing no damaged joint locks or pin pockets, and
(8) Form lengths at least 10 ft [3 m] long with horizontal joint and base width equal to the depth of the forms.

For pavements with radii no greater than 100 ft [30 m], use flexible or curved forms approved by the Engineer. Provide devices to securely set forms and withstand operation of the paving equipment without springing, settlement, or lateral displacement. Provide forms with joint locks to tightly join ends of

abutting form sections together. Connect individual form sections using methods creating a continuous form.

Set the forms to the proper alignment and grade as shown in the Plans for a distance equal to at least 3 h ahead of concrete placement.

Compact the foundation before placing the forms in accordance with 2301.3.B. Ensure the forms have a firm and uniform bearing over the entire base area, are tightly joined and securely staked, and are clean and free of accumulations of hardened concrete. Coat the contact faces of the forms with an approved form coating material in accordance with 3902 before placing the concrete.

During a rain event, remove and reset the forms as necessary to allow drainage.

D Concrete Equipment and Paving Operations

Provide self-propelled spreading and finishing machines capable of consolidating and finishing the concrete, and producing a finished surface meeting the requirements specified.

D.1 Slipform Construction

Place concrete using a slipform paver or combination of pavers designed to spread, consolidate, screed, and float-finish the freshly placed concrete with minimum hand finishing. Provide a slipform paver with a non-oscillating extrusion plate with an adjustable angle of entry.

Place the concrete pavement prior to placing curb and gutter. If the sequence of operations includes placing the curb and gutter prior to the concrete pavement, submit a jointing plan to the Engineer for approval prior to placing the curb and gutter.

Consolidate the full width and depth of concrete pavement placed by a single pass of a series of internal vibrators. Operate full-width vibrators from 3,600 VPM [60 Hz] to 7,000 VPM [117 Hz] in concrete and from 4,150 VPM [70 Hz] to 8,000 VPM [133 Hz] when checked in air. Deliver the vibrator impulses directly to the concrete and operate at an intensity to consolidate the concrete uniformly throughout the entire depth and width of the concrete. The Contractor may increase the vibrator frequency as approved by the Engineer. Perform additional testing as required by the Engineer at no additional cost to the Department. If the vibrator fails, suspend operations and remove unconsolidated concrete.

Regulate the rate of progress of the vibratory equipment and the duration of the application to fully, but not excessively, vibrate the concrete. Suspend the operation of vibrators if the forward progress of the paver stops.

Attach vibrators to spreading or finishing equipment. Do not allow vibrators to come in contact with preset dowel basket assemblies, the grade, pavement reinforcement, or side forms. Do not allow the operation of vibrators to cause separation or segregation of the mix ingredients, including the downward displacement of large aggregate or the accumulation of laitance on the concrete surface. The Contractor may reduce the vibration frequency within the specified range if reducing the forward progress of the paver to avoid segregation of the concrete mix. Connect the power to all vibrators so that they cease when the machine motion is stopped. Stop paving operations if a vibrator fails to operate within the specified range.

Provide an electronic monitoring device meeting the following characteristics and requirements to display the operating frequency of each individual internal vibrator for concrete pavement placed by the slipform method:

(1) Contains a readout display near the operator's controls; visible to the paver operator and to the Engineer,
(2) Operates continuously as the paving machine operates,

(3) Displays all the vibrator frequencies with manual and automatic sequencing for each of the individual vibrators, and

(4) Records the following at least every 25 ft [7.62 m] of paving or at least every 5 min of time:

(4.1) Clock time,

(4.2) Station location,

(4.3) Paver track speed, and

(4.4) Operating frequency of individual vibrators.

Provide an electronic copy containing the record of data after the completion of the concrete paving operation. Provide vibration data daily as directed by the Engineer.

Operate the slipform paver with a continuous forward movement, and coordinate all operations of mixing, delivering, and spreading concrete to provide uniform progress with minimal stopping and starting of the paver.

Equip the paver with automatic grade control capable of maintaining both elevation and longitudinal line as shown in the Plans at both sides of the paver, by controlling the elevation of one side and controlling the crown, or by controlling the elevation of each side independently. Achieve the grade reference by means of an erected string line.

Tightly stretch a wire or string line set parallel to the established grade for the pavement surface to achieve the grade reference. Set the control reference and support the line at intervals to maintain the established grade and alignment.

D.2 Fixed Form Construction

Place concrete using one or more machines to spread, screed and consolidate between previously set side forms. Accomplish vibration of these areas using hand held or machine mounted internal vibrators.

If not using an electronic monitoring device, use a tachometer or similar device to demonstrate to the Engineer that the paving equipment vibration meets the requirements in this section.

Use hand held vibrators to consolidate concrete adjacent to side forms and fixed structures. Operate the hand held vibrators at a speed of at least 3,600 VPM [60 Hz]. Do not allow the vibrator head to contact the joints, load transfer devices, reinforcement, grade, or side forms. If the vibrator fails, suspend operations and remove unconsolidated concrete.

Continue vibration to achieve adequate consolidation, without segregation, for the full depth and width of the area placed.

Furnish an adequate number and capacity of machines to perform the work at a rate equal to the concrete delivery rate.

Strike-off concrete with a clary screed unless otherwise allowed by the Engineer. Finish small or irregular areas that are inaccessible to finishing equipment using other methods as approved by the Engineer.

Discontinue any operation that causes displacement of the side forms from the line or grade or causes undue delay, as determined by the Engineer, due to mechanical difficulties.

E Batching and Mixing

Batch and mix the concrete in accordance with 2461 and the following:

E.1 Batching Requirements

Perform the initial spot check of the measuring equipment in accordance with the MnDOT Concrete Manual for accuracy and sensitivity before starting production operations. Provide a copy of the inspection certificate to the Engineer.

Provide to the Engineer a computerized batch ticket that includes the following:

(1) Date,
(2) State project number (SP) or (SAP),
(3) Time concrete was batched,
(4) Quantity of concrete in this load,
(5) Running total of each type of concrete, each day for each project,
(6) Mix number,
(7) Labels identifying each material that correlates with the Contractor mix design, including cementitious and admixture abbreviations or MnDOT 5 digit pit numbers),
(8) Target weight of materials,
(9) Actual batched weights of materials,
(10) Temper water, and
(11) Total water weight.

Suspend batching and mixing operations if satisfactory finishing and curing of the pavement does not occur as determined by the Engineer..

E.2 Cement Cutoff and Yield

Submit the cement records to the Engineer. Make positive cement cutoffs, except if providing cement proportioned in a certified ready-mix plant, and delivering the batch to the construction site in truck mixers, in accordance with the following:

(1) Perform individual cement cutoffs at the following intervals:
  (1.1) After using 500,000 lb [250 tonne] of cement,
  (1.2) Before using 2,000,000 lb [1,000 tonne] of cement,
  (1.3) Using at least every 3,000,000 lb [1,500 tonne] or once a week, whichever provides the longer time interval between cutoffs.
(2) If delivering bulk cement directly to the concrete batching plant in railroad cars or sealed transport trucks, submit copies of the freight bills to the Engineer on the same day received from the transporting company.
(3) Advise the Engineer of the method and schedule of cement unloading. Do not unload cement until the Engineer approves the operation.

The Engineer will verify the following:

(1) Individual cutoffs do not show an underrun in cement usage greater than 1.5 percent of the quantity specified, and
(2) The final cutoff does not show an overall underrun greater than 1.0 percent.
(3) If either one or both of these limitations are exceeded, the Engineer will not pay for the concrete represented at the Contract unit bid prices.

The Engineer may reject defective concrete in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work," or the Department may pay for the defective concrete at an adjusted unit price at the same ratio to the Contract unit price as the quantity of cement used to the quantity of cement required less the allowable underrun. If the cement exceeds the limitations for individual cutoff and final cutoff, the Department may apply the price adjustment to the cutoff value that produces the greatest monetary deduction.

F Placing Concrete

Dump or discharge concrete without causing grade displacement or damage to the existing asphalt or bond breaker layer. Repair damage to the grade, existing asphalt, or bond breaker layer as approved by the Engineer, at no cost to the Department. Provide protection for turning concrete trucks.

Maintain the grade in a moist condition until placement of concrete.

Construct mainline pavement in a single layer of concrete. Place the concrete pavement in one complete pass of the paving machine to minimize the need for hand finishing.

Coordinate paving operations for mixing, delivering, spreading, and extruding the concrete to provide uniform progress of the paver. Use sufficient trucks to ensure a steady forward progress of the paver. If the forward movement of the paver stops for a period long enough to create a cold joint or honeycombing, construct a header joint in accordance with 2301.3.H.3.

Do not add water to the surface of the concrete to aid in finishing without the approval of the Engineer.

When placing concrete on asphalt or asphalt bond breakers comply with the following:

(1) Do not place concrete on an asphalt surface with an asphalt surface temperature greater than 120° F [50° C].
(2) Maintain the asphalt surface in a moist condition as necessary and at a surface temperature not greater than 120° F [50° C] before placing the concrete.
(3) The Engineer will allow the Contractor to apply water and/or a whitewash of hydrated lime and water to cool the asphalt surface or other methods allowed by the Engineer.
(4) Before placing concrete on a milled asphalt surface, clean the milled surface by sweeping, and patch as shown in the Plans in accordance with 2231or as required by the Engineer.

When placing concrete adjacent to in-place concrete pavement, protect the following:

(1) All ends of transverse joints 3/16 in [5 mm] or wider to the satisfaction of the Engineer. The Engineer will allow sawing through the existing joint when sawing the newly placed concrete, and
(2) The in-place pavement to prevent damage.

Do not allow the edges of the pavement, including longitudinal joints, to deviate from the line shown on the Plans by greater than ½ in [13 mm] at any point.

Set manhole and catch basin frames or rings to the required elevation during the paving operations.

F.1 Consistency

For slipform concrete pavement placement, place the concrete with a slump value that optimizes placement, except ensure the concrete does not slough or slump and is adequately consolidated and meets all other requirements. Maintain the concrete at a uniform consistency. The Engineer will not allow an edge slump greater than ⅛ in [3 mm] or irregular edge alignment.

For fixed form placement, place the concrete with a slump no greater than the maximum allowable slump in accordance with 2461.4A4a.

F.2 Air Content

Maintain the air content of Type 3 paving concrete at the specified target of 7.0 percent ±1.5 percent of the measured volume of the plastic concrete in accordance 1503.

Make any adjustments immediately to maintain the desired air content.

Measure the air content after placement on the grade but before consolidation.

If using the slipform paving method, establish an air loss correction factor (ACF) to determine the air content after consolidation once per half day of paving. Apply the ACF to tests taken before consolidation to estimate the air content after consolidation. Place concrete with an air content of at least 5.0 percent after consolidation.

Take the following actions for the following air content test results with the ACF applied or a test taken after consolidation:

(1) A single test (QC or QA) from 5.0 percent to 5.5 percent, adjust the mix design to obtain an air content greater than 5.5 percent without stopping production,

(2) Two consecutive tests (QC or QA) from 5.0 percent to 5.5 percent, make immediate adjustments to obtain an air content greater than 5.5 percent or stop production. Test every truck until the air content test results meet the requirements. Test at least three additional trucks after obtaining the correct air content.

(3) Any test (QC or QA) less than 5.0 percent, make immediate adjustments to obtain an air content greater than 5.5 percent or stop production. Test every truck until the air content meets the requirements. Test at least three additional trucks to ensure the concrete remains within compliance. Perform additional testing on the hardened concrete as required by the Engineer in conjunction with the Concrete Engineer.

F.2.a Non-Conforming Material

Only place Type 3 concrete meeting the air content requirements in the work. If the Contractor places Type 3 concrete not meeting the air content requirements into the work, the Engineer will not accept nonconforming concrete at the Contract unit price. For concrete not meeting the required air content, the Engineer will make determinations regarding the disposition, payment, or removal. The Department will adjust the Contract unit price for the Contract pay item of the concrete in accordance with Table 2301-12. When there is not a separate Structural Concrete bid price for an item of work, the Department will reduce payment based on a concrete price of $60.00 per cu. yd [$78.00 per cu. m] or the Contractor-provided invoice amount for the concrete in question, whichever is less.

Table 2301-12 Paving Concrete	
Air Content Before Consolidation, %	Adjusted Contract Unit Price
>10.5	The Department will pay 75 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer.
>8.5 – ≤10.5	The Department will pay 95 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer
5.5 – 8.5	The Department will pay 100 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer
>4.5 – <5.5	The Department will pay 75 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer
>4.0 – ≤4.5	The Department will pay 25 percent of the Contract unit price for the concrete represented and placed as approved by the Engineer. If the Engineer, in conjunction with the Concrete Engineer, determines the surface is exposed to freeze-thaw cycling, coat the concrete with an approved epoxy penetrant sealer from the MnDOT Approved Products list.
≤4.0	Remove and replace concrete in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work" as directed by the Engineer. If the Engineer, in conjunction with the Concrete Engineer, determines the concrete can remain place, the Engineer will not pay for the concrete and if the Engineer determines the surface is exposed to salt-brine freeze-thaw cycling, coat with an approved epoxy penetrant sealer from the MnDOT Approved Products list.

G Placing Reinforcement

Provide and place reinforcement meeting the following requirements and characteristics:

(1) Provide epoxy coated reinforcement in accordance with 2472.
(2) Provide and place reinforcement bars including keyway bars, tie bars, taper steel, and stopper bars.
(3) Place keyways as shown on the plans.
(4) Provide and place supplemental pavement reinforcement as shown on the plans.
(5) Provide and place reinforcement bars on chairs, in stakes, utilizing tie bar basket assemblies or by appropriate equipment for depressing the bars to the specified location.
(6) For slipform paving, stake the tie bar steel to the roadbed, or use a mechanical device attached to the spreader or paver to place tie bar steel required for L1T joints as shown on the plans. Space and depress the tie bar steel to the desired depth and location as shown on the plans. Do not place tie bars over a dowel bar assembly.

H Joint Construction

Unless otherwise shown on the plans, construct all joints perpendicular to the grade. Place dowel bars parallel to the grade and parallel to the centerline of the pavement.

H.1 Dowel Bar Placement

Provide dowel bar assemblies manufactured in single units for the lane widths as shown on the plans, unless otherwise approved by the Engineer. Do not use more than two assembled sections in any one joint for ramps, loops, and tapered sections.

Secure the dowel bar assemblies to prevent movement during concrete placement in accordance with MnDOT Standard Plate 1103 and the following:

(1) If placing dowel bar assemblies on asphalt or asphalt bond breaker layers, secure the assemblies with at least seven anchorage points. Place four of the anchorage points on the assembly side facing the front of the paver. Fasten the assemblies in accordance with the following:

(1.1) Place pins or fasteners of sufficient length and shank diameter of at least 0.177 in [0.45 cm] to penetrate through the asphalt bond breaker layer and into the concrete at least 1 in [25 mm] or at least 2 in [50 mm] into the in-place asphalt layer,

(1.2) Before paving, demonstrate the fastening method to the Engineer for approval.

Within 1 h before covering with concrete, coat the dowel bars with a thin uniform coating of an approved form coating material in accordance with 3902 and listed on the MnDOT Approved Products List.

Before placing the concrete, mark the location on both sides of each transverse joint as approved by the Engineer. Transfer the markings to the fresh concrete immediately after completing the final finishing operations.

The Contractor may use a mechanical dowel bar inserter to place dowel bars in the pavement as approved by the Engineer, in conjunction with the Concrete Engineer. Immediately before inserting the dowels, coat the dowels with a thin uniform coating of an approved form coating material in accordance with 3902 and listed on the MnDOT Approved Products List. If using a dowel bar inserter, initially and on each production day, demonstrate to the Engineer that the inserted dowel bars in the completed concrete pavement are parallel to the surface and centerline slab and are located at mid depth of the slab thickness.

H.1.a Quality Control Plan for Dowel Basket Assemblies

Provide a Quality Control Plan in writing to the Engineer for acceptance that provides a method for keeping the dowel basket assemblies anchored to the existing asphalt or bond breaker layer and into the underlying concrete. The Quality Control Plan shall include the following at a minimum:

(1) Proposed type and number of fasteners
(2) Dowel basket assembly anchoring plan (ie. Anchored all basket assemblies prior to concrete placement, one lane at a time, anchor all basket assemblies during the concrete placement operation, etc.)
(3) Procedure if assemblies do not hold with the proposed method
(4) Sampling rate for locating basket assemblies with the MIT-SCAN T2

H.2 Joint Establishment

Space contraction joints at the intervals shown on the plans, except shorten the spacing at the following to provide panel lengths at least 5 ft [1.5 m]:

(1) Adjacent to header joints,
(2) Reinforced panels,
(3) Railroad grade crossings, and
(4) Free ends of pavement.

Provide either wet-cut saws referred to as "conventional concrete saws" or lighter weight dry-cut saws referred to as "early-entry concrete saws" capable of establishing joints sooner than the conventional saws.

Provide initial joint sawing as shown on the plans. Perform the initial sawing as soon as the concrete will support the joint sawing operation without raveling and before random cracking occurs.

Immediately after completing the joint sawing, use water under nozzle pressure to remove the sawing residue from each joint and the pavement surface.

If widening is necessary, do not widen the joints to full width until the concrete is at least 24 h old or longer if the sawing causes raveling of the concrete.

Stake preformed joint filler material for expansion joints in place to maintain proper position as shown on the Plans during concrete placement.

Extend transverse joints constructed in the pavement through the integrant curb.

H.3 Constructing Headers

Construct construction headers, temporary headers, and permanent headers as shown on the plans.

The Engineer will not allow incorporating any concrete accumulated in the grout box of the paver into the pavement. Construct all headers such that the concrete contained in the grout box is removed from the Project. Use any approved construction header method as shown in the Standard Details.

Use internal vibration to consolidate the concrete along header joints before final finishing.

I Surface Finishing

Use a ⅜ in [10 mm] radius edging tool to finish edges of the pavement.

After consolidating, screeding, and floating the concrete, give the pavement surface a final finish texture in accordance with 2301.3.I.1, "Pavement Texture" unless 2301.3.I.2, "Pavement Tining" is required in the Contract.

I.1 Pavement Texture

Test the adequacy of the pavement skid resistance meeting the requirements of ASTM E 965-87, "Test Method for Measuring Surface Macrotexture Depth Using a Sand Volumetric Technique." Provide a texture depth of at least $^{1}/_{25}$ in [1.00 mm].

The Department defines a lot as pavement of a single lane. Establish a separate lot for each lane on the Project.

The Department defines a sublot as the rate at which an individual measurement is taken over a given length. The Department considers a sublot as one lane wide, measured in accordance with the following:

(1) From the pavement edge to the adjacent longitudinal joint,
(2) From one longitudinal joint to the next, or
(3) In the absence of a longitudinal joint, between pavement edges.
(4) Each ramp and loop 18' (5.5 m) wide or less is considered a single lane.

The Engineer will break lots into sublots representing 1,000 linear ft [300 m] of pavement. Test the pavement surface at a point located transversely in the outside wheel path as determined by the Engineer. Test adjoining driving lanes at the same location. The Engineer will determine the locations using a random number multiplied by length of the sublot. If the Project or individual lane results in less

than three sublots, the Engineer will divide the Project or individual lane lot into three sublots of equal length.

Complete surface texture testing no later than 24 hours after pavement placement unless otherwise approved by the Engineer. Refer to Table 2301-13for the acceptance criteria of texture depths below the specification limits.

Table 2301-13
Pavement Texture Depth

Texture Depth Test Results for Individual Tests	Acceptance Criteria
$< {}^{1}/_{25}$ in to $\geq {}^{1}/_{32}$ in [< 1.00 mm to ≥ 0.80 mm]	The Engineer will accept the work if the Contractor amends the operation to achieve the required depth of at least $^{1}/_{25}$ in [1.00 mm] as approved by the Engineer. If the Contractor fails to correct the operation, the Engineer will suspend the paving operation until corrections produce the required results.
$< {}^{1}/_{32}$ in [< 0.80 mm]	Perform concrete grinding of the pavement represented by this test to attain the necessary texture of $^{1}/_{25}$ in [1.00 mm] as required by the Engineer.

Run additional tests at 100 ft [30 m] intervals before and after the failing test location to determine the limits of any individual failing test.

I.2 Pavement Tining

Pull a carpet drag longitudinally along the pavement before the concrete attains its initial set to obtain the final finish. Mount the drag on a bridge. Provide a drag with the following dimensions:

(1) As wide as the concrete placed, and
(2) Longitudinal length with sufficient surface contact to produce a texture approved by the Engineer.

Provide an artificial grass type carpeting for the carpet drag meeting the following characteristics and requirements:

(1) Molded polyethylene pile face,
(2) Blade length from ⅝ in to 1 in [15 mm to 25 mm], and
(3) Total weight of at least 70 oz per sq. yd [2.35 kg per sq. m].

Provide a backing made of a strong, durable material not subject to rot with the backing adequately bonded to the facing to withstand the specified use.

Immediately after carpet dragging the pavement surface, use a mechanized device providing a randomized tine spacing from ⅝ in to 1 in [16 mm to 26 mm] to apply a transverse metal-tine texture to the pavement meeting the following dimensions:

(1) Width from ½ in to ⅛ in [2 mm to 3 mm] and
(2) Depth from ⅛ in to $^{5}/_{16}$ in [3 mm to 8 mm].

Do not dislodge coarse aggregate particles. The Contractor may use manual methods to achieve similar results on ramps and other locations as approved by the Engineer. The Contractor may use other texturing equipment to obtain an equivalent texture as approved by the Engineer.

The Engineer will not require metal-tine texturing on subsidiary paving areas such as cross-overs and parking lanes exempted by the Engineer, or on areas with speed limits no greater than 35 mph [55 km/h] as specifically exempted by the Contract or the Engineer.

J Concrete Curing and Protection

After completing final finishing operations, cure all exposed concrete surfaces. Use one of the following curing methods:

(1) Place the membrane curing compound conforming to 3754 or 3755 within 30 minutes of concrete placement or once the bleed water has dissipated unless otherwise directed by the Engineer in accordance with 2301.3.J.1.a. Place the membrane curing compound on the edges within 30 minutes after permanent removal of the forms or curing blankets unless otherwise specified in the Contract.

(2) Place plastic curing blankets or completely saturated burlap curing blankets as soon as practical without marring the surface in accordance with 2301.3.J.1.b..

Whenever weather conditions are such as to cause unusual or adverse placing and finishing conditions or equipment failures occur, expedite the application of a curing method or temporarily suspend the mixing and placing operations, as the conditions require.

If necessary to remove the coverings to saw joints or perform other required work, and if the Engineer approves, remove the covering for the minimum time required to complete that work.

Failure to comply with the above provisions will result in the Engineer, in conjunction with the Concrete Engineer, applying a monetary deduction in accordance with 1503. When there is not a separate Structural Concrete bid price for an item of work, the Department will apply a monetary deduction of $30.00 per cu. yd [$39.00 per cu. m] or 50% of the Contractor-provided invoice amount for the concrete in question, whichever is less.

J.1 Curing Methods

J.1.a Membrane Curing Method

Before application, agitate the curing compound as received in the shipping container to obtain a homogenous mixture. Protect membrane curing compounds from freezing before application. Handle and apply the membrane curing compound in accordance with the manufacturer's recommendations.

Apply the curing compound in accordance with the following:

(1) At a rate of 1 gal per 150 sq. ft (1 L per 4 m^2) of surface curing area.

(2) Apply curing compound homogeneously to provide a uniform, solid, white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper). If using a Department - approved curing compound with a non-white base color, apply the compound to provide a uniform, solid, opaque consistency meeting the intent of the requirement in this section.

(3) If the curing compound is damaged during the curing period, immediately repair the damaged area by re-spraying.

(4) If the Engineer determines that the initial or corrective spraying result in unsatisfactory curing, the Engineer may require the Contractor to use the blanket curing method at no additional cost to the Department.

Use the fully-automatic, self-propelled mechanical power sprayer approved by the Engineer to apply the curing compound in accordance with the following:

(1) Operate the equipment to direct the curing compound to the surface from two different lateral directions,
(2) Do not allow the sprayer to ride on the pavement surface,
(3) Ensure the sprayer covers the entire lane width and atomizes the curing compound, and
(4) If puddling, dripping, or non-uniform application occurs, suspend the operation to perform corrections as approved by the Engineer.

Use a fully-automatic, self-propelled mechanical power sprayer equipped with the following to apply curing compound as approved by the Engineer:

(1) A re-circulating bypass system that provides for continuous agitation of the reservoir material,
(2) Separate filters for the hose and nozzle,
(3) Check valve nozzles,
(4) Multiple or adjustable nozzle system that provides for variable spray patterns,
(5) A shield to control loss of material by wind action, and
(6) A spray bar drive system that operates independently of the wheels or track drive system.

The Engineer will permit an airless spraying machine for applying the curing compound on pavements that are 10 feet (3 m) or less in width and irregular shaped surfaces that comply with the following:

(1) A re-circulating bypass system that provides for continuous agitation of the reservoir material,
(2) Separate filters for the hose and nozzle, and
(3) Multiple or adjustable nozzle system that provides for variable spray patterns.

J.1.b Blanket Curing Method

After completion of the finishing operations and without marring the concrete, cover the concrete with curing blankets. Install in a manner that envelops the exposed concrete and prevents loss of water vapor. After the concrete has cured, apply membrane curing compound to the concrete surfaces that will remain exposed in the completed work.

J.2 Protection Against Rain

Protect the concrete from damage due to rain. Have available, near the site of the work, materials for protection of the edges and surface of concrete. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the rain-damaged concrete to 1503 and 1512.

J.3 Protection Against Cold Weather

If the national weather service forecast for the construction area predicts air temperatures of 36 °F [1 °C] or less within the next 24 h and the Contractor wishes to place concrete, submit a cold weather protection plan.

Protect the concrete from damage including freezing due to cold weather. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the damaged concrete to 1503 and 1512.

J.3.a Cold Weather Protection Plan

Submit a proposed time schedule and Plans for cold weather protection of concrete in writing to the Engineer for acceptance that provides provisions for adequately protecting the concrete during

placement and curing. Do not place concrete until the Engineer accepts the Contractor's cold weather protection plans.

J.4 Vibratory and Backfilling Protection

Protect newly placed concrete from damage by adjacent vibratory or backfilling operations for a minimum of 24 hours. Resume vibratory and backfilling operations after the concrete has reached a minimum compressive strength of 2000 psi [13.7 MPa] or a flexural strength of 250 psi [1.7 MPa]. Cast concrete control specimens in accordance with 2461.4A5. The Engineer will test the control specimens. If the Engineer discovers evidence of damaged concrete, the Engineer will suspend work until the Contractor corrects the work. The Engineer may reject damaged concrete in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work."

The Contractor may use hand operated concrete consolidation equipment, walk behind vibratory plate compactors, rollers in "static" mode, and fine grading machines 24 h after placing the concrete, and other equipment as approved by the Engineer in conjunction with the Concrete Engineer.

K Removal of Forms

Do not remove side forms of pavement and back forms on integrant curb earlier than 12 h after placing the concrete, unless otherwise approved by the Engineer. Remove forms without exerting shock or strain, including temperature variations, on the pavement or curb. Cure concrete in accordance with 2301.3.J.1.a.

L Joint Sealing

Provide an approved sealant in accordance with 3725 and listed on the MnDOT Approved Products List, unless the type of sealant for contraction joints is otherwise specified in the Contract.

Do not seal joints with silicone in accordance with 3722 if the concrete mixture contains Class B coarse aggregate as defined in 3137.

Perform joint sealing as shown on the Plans and in accordance with the following:

(1) Seal joints after the Engineer inspects and approves the joints,
(2) Perform joint sealing on surface dry concrete after cleaning the joints of debris, dirt, dust, and other foreign matter, including accumulations of concrete,
(3) Lightly sandblast the joint walls before final compressed air cleaning,
(4) Immediately before sealing the joints, clean the joints with a jet of compressed air under pressure of at least 85 psi [580 kPa],
(5) Seal transverse integrant curb joints with the same joint sealer used to seal the pavement joints,
(6) Seal joints in accordance with the tolerances shown on the plans,
(7) Provide backer rod material compatible with the sealer as shown on the plans, and
(8) Remove and replace sealer at joints filled above the permissible level as shown on the Plans at no additional cost to the Department.

Handle and place joint sealer material as recommended by the manufacturer and in accordance with the following requirements:

L.1 Hot Poured Sealers

Heat hot poured sealers in a double-boiler type kettle or melter. Fill the space between inner and outer shells with oil or other material as allowed by the Manufacturer. Provide heating equipment with automatic temperature control, mechanical agitation, and recirculating pump. Use heating equipment as

recommended by the manufacturer of the sealer material. Do not melt quantities of sealer material greater than the quantity used within the same day. After heating the sealer material to the application temperature, maintain the material temperature until placement. Place the sealer material within 4 h after the initial heating to the application temperature.

Apply sealant to the pavement at ambient pavement temperatures greater than 39° F [4° C].

L.2 Silicone Sealers

Install silicone sealers as recommended by the manufacturer.

L.3 Preformed Sealers

Provide preformed seals in one continuous length for each joint, except the Contractor may use butt splices in transverse joints at longitudinal joints.

Do not stretch the preformed sealer material in the installation process by greater than 5 percent of the joint length.

M Workmanship and Quality

M.1 Defective Pavement

The Department will pay for concrete pavement meeting the requirements and tolerances in accordance with this section at the Contract unit price. Pavement that fails to meet the minimum requirements when tested in the prescribed manner is considered defective. The Department may reject or adjust the payment for defective concrete pavement in accordance with 1503, "Conformity with Plans and Specifications" and 1512, "Unacceptable and Unauthorized Work."

The Engineer will determine the limits of each individual defective pavement area. If adjusting the price for defective payment, the Engineer will measure the area to the nearest whole square yard [square meter], except the Engineer will consider areas less than 1 sq. yd [1 sq. m] as 1 sq. yd [1 sq. m]. The Engineer will determine the condition of each individual defective area of pavement based on the calculation of greatest deficiency within that area.

M.2 Random or Uncontrolled Cracking

Repair or replace pavement with random or uncontrolled cracks as directed by the Engineer. If repairing the pavement as directed by the Engineer, use a dowel bar load transfer technique in accordance with the Department's Concrete Pavement Rehabilitation Details on the Department's website. Submit the intended repair technique to the Engineer for approval. Perform pavement repairs at no additional cost to the Department. If the repair fails, replace the pavement at no additional cost to the Department. The Engineer will accept repairs in accordance with 1516, "Acceptance of Work."

M.3 Pavement Smoothness – IRI (International Roughness Index)

Provide concrete pavement smoothness in accordance with 2399.

N Thickness Requirements

Provide pavement with a finished pavement thickness as shown on the Plans or as modified, in writing, by the Engineer.

THE ENGINEER MAY ELECT TO NOT PERFORM CONCRETE CORES

N.1 Procedure

Construct pavement to the thickness shown on the plans. On each Project and on each roadbed of a divided highway, evaluate pavement thickness in accordance with the following:

(1) Contractor Quality Control Probing (QCP),
(2) Probe Verification Core (PVC), and
(3) Quality Acceptance Core (QAC).

The Department defines plan thickness lot (PTL) as concrete pavement of the same thickness added together lineally. Establish a separate PTL for each concrete plan thickness on the Project.

The Department defines a sublot as the rate at which an individual measurement is taken over a given length. The Department considers a sublot as one lane wide, measured in accordance with the following:

(1) From the pavement edge to the adjacent longitudinal joint,
(2) From one longitudinal joint to the next, or
(3) In the absence of a longitudinal joint, between pavement edges.
(4) Each ramp and loop 18ft (5.5 m) wide or less is considered a single lane.

The Engineer will divide the PTL into sublots of 4,000 lineal lane ft [3,300 lineal lane m] to determine the QCP, PVC, and QAC locations. The Engineer will add partial sublots less than 2,000 ft [1,650m] to the previous lot. The Engineer will consider partial sublots equal to or greater than 2,000 lineal lane ft [1,650 lineal lane m] as individual sublots. If the PTL for the entire Project is less than 4,000 lineal lane ft [3,300 lineal lane m] the Engineer will consider the PTL as an individual sublot.

The Engineer will identify the QCP, PVC, and QAC thickness measurement locations in accordance with the following:

(1) Determine the longitudinal locations using random numbers multiplied by length of the sublot.
(2) Determine the transverse offset locations using a random number multiplied by the width of the traffic lane, ramp, or loop at the determined longitudinal location.
(3) Adjust the location to ensure the Contractor takes no measurements within 1 ft [0.3 m] of the pavement edge and takes no measurements within 2 ft [0.60 m] of any transverse or longitudinal joint or other obstructions.

N.2 Contractor Quality Control Probing (QCP)

Measure the pavement thickness of freshly finished concrete pavement at a rate of at least four QCP measurements per sublot. Notify the Engineer before performing probing thickness measurements in the plastic concrete so they may inspect or observe the Contractor's QCP tests during the paving operations.

Provide daily summary reports listing the results of the day's QCP thickness measurements and additional probing results to the Engineer.

N.3 Contractor QCP Probing Equipment and Probing Method

Provide the following equipment as approved by the Engineer to perform QCP probing:

(1) Probing rod meeting the following characteristics and requirements:
  (1.1) Non-flexing,
  (1.2) Length capable of completely penetrating the pavement for measuring,

(1.3) Utilizes a circular or square top plate,
(1.4) Contains a centrally located hole in the top plate with a diameter allowing for easy maneuvering along the length of the probing rod, and
(1.5) Fitted with a locking device fixing the angle between the top plate and the probing rod at 90 degrees when locked.

(2) Base plate meeting the following characteristics and requirements:
(2.1) 10.5 in [267 mm] square 26 gage galvanized steel plates or 11.8 in [295 mm] diameter 28 gage high strength steel circular plates or,
(2.2) Rigid when in place, allowing the probing rod to be pushed against it without flexing, and

(3) Work bridge meeting the following characteristics and requirements:
(3.1) Spans the full width of the freshly laid concrete,
(3.2) Supports a person, and
(3.3) Height above the concrete allows for the use of the probing device.

(4) Tape measure accurate to nearest ⅛ in [even mm] and with a length capable of measuring the depth of penetration of the probing device into the plastic concrete pavement.

Perform probing in accordance with the following:

(1) Place the base plates at the randomly selected locations and anchor the plates to prevent movement during concrete placement. Mark the locations of the base plates to ensure ease of locating the plates after the paver has passed,
(2) Position the bridge at the selected locations to reach and locate each point,
(3) Assemble the probing device. Keeping the probing rod perpendicular to the pavement surface, insert the rod into the plastic concrete until the rod strikes the base plate,
(4) Slide the top plate down the probing rod until it contacts the pavement surface, then lock to the probing rod,
(5) Withdraw the probing device, and
(6) Measure the length of the probing rod inserted into the plastic concrete from the underside of the top plate to the end of the probing rod. Record this measurement to the nearest ⅛ in [even mm].

N.4 Quality Acceptance Testing – Coring

The Engineer will measure the pavement thickness of concrete for each sublot in accordance with the following:

(1) Probe Verification Core (PVC), and
(2) Quality Acceptance Core (QAC).

The Engineer will mark one of every four QCP measurement locations per sublot for a PVC. The Engineer will mark one QAC per sublot. The Contractor will core at the designated PVC and QAC locations.

N.5 PVC and QAC Coring Method

(1) Begin coring on concrete older than 7 days, when the control beams attain a flexural strength in accordance with Table 2301-1, or when the control cylinders attain a compressive strength of 3,000 psi [20.6 MPa]. Use 3U18 concrete or another concrete mix approved by the Engineer to fill the core holes within 72 h of coring at no additional cost to the Department. Provide traffic control for coring;
(2) Cut 4 in [100 mm] nominal diameter cores at marked locations. Lay the cores next to the holes in a curing condition. Protect the cores. Do not submit cores out of round, not perpendicular, or containing ridges;

(3) The Engineer will field measure the core thickness to the nearest ⅛ in [even mm], verify (Field ID Number) the cores, and record the field measurement on MnDOT Form 24327, "Field Core Report" or a computerized spreadsheet available on the MnDOT Concrete Engineering website;

(4) Pick up the cores, accompanied by the Engineer. Store the cores in a water tank heated from 60° F to 80° F [15° C to 25° C] at the Department field office. The Engineer will not require the storage of cores in a curing condition for concrete older than 28 days;

(5) The Engineer will transport the cores in a curing condition, unless older than 28 days, to the MnDOT Office of Materials and Road Research; and

(6) The MnDOT Office of Materials and Road Research will determine the pavement thickness by measuring the length of the PVC and QAC cores in accordance with the procedure on file at the MnDOT Office of Materials and Road Research. Following this procedure, the MnDOT Office of Materials and Road Research will use nine probes interconnected in a hydraulic linkage to obtain the average length of the core in one operation. The MnDOT Office of Materials and Road Research will record the core length to the nearest 0.05 in [1 mm].

N.6 Non-conforming thickness

The Department will base acceptance of the pavement thickness and price adjustment for deficient thickness on the combination of both lab measured PVC and QAC coring.

The Department defines the tolerance limit for pavement thickness as the plan thickness lot (PTL) minus ½ in [13 mm]. If the QCP measurement shows a thickness deficiency greater than PTL minus ½ in [13 mm], take a core at the location of the deficient QCP. If any core thickness measurement (PVC or QAC) shows a thickness deficiency greater than PTL minus ½ in [13 mm], consider the pavement defective and take exploratory cores as directed by the Engineer.

The Department defines the defective pavement area as the entire area surrounding the deficient core within a traffic lane and between acceptable cores. The Department considers the pavement acceptable in the remaining areas as the increment where the cores show a thickness deficiency no greater than PTL minus ½ in [13 mm].

Take the first exploratory cores at any location within 10 ft [5 m] on each side of the deficient thickness location and at the same distance from the pavement centerline. Take an additional exploratory core in the adjacent traffic lane if the concrete was placed in the same operation. If the length of each of the first exploratory cores is at least equal to the PTL minus ½ in [13 mm], the Engineer will not require additional cores from this location. If any cores do not fall within the PTL minus ½ in [13 mm], take additional exploratory cores at 25 ft [10 m] intervals and at the same distance from the pavement centerline in the same lane as the original thickness measurement, as directed by the Engineer. Perform coring in the direction of the deficiency until obtaining a core with a length at least equal to the PTL minus ½ in [13 mm]. The Engineer will use exploratory cores to determine the extent of deficient pavement thickness for adjusting the unit bid price or requiring pavement removal and replacement.

For cores showing a pavement thickness greater than the PTL minus ½ in [13 mm] to 1 in [25 mm], the Contractor may choose one of the following:

(1) Remove and replace the defective pavement area, or

(2) Leave the pavement in place with a monetary deduction of $20 per sq. yd [$25 per sq. m] for the defective pavement area, as approved by the Engineer.

For cores showing a pavement thickness greater than PTL minus 1 in [25 mm], the Engineer, in conjunction with the Concrete Engineer, will determine whether the Contractor will remove and replace concrete pavement or leave the pavement in place at no cost to the Department and apply a monetary deduction of $20 per sq. yd [$25 per sq. m] for the defective pavement area in accordance with 1503.

The Engineer will use the PVC and QAC cores to determine the final average plan thickness lot (PTL), except for the following:

(1) If exploratory cores are taken to identify the defective pavement area, substitute the two outside exploratory cores that are within PTL minus ½ in [13 mm] for the deficient PVC or QAC.

(2) If the length of a PVC or QAC exceeds the by PTL plus 0.30 in [8 mm], the Engineer will limit the core length to the PTL plus 0.30 in [8 mm].

The Engineer will consider the pavement thickness as conforming provided the deficiency of the final average PTL does not exceed PTL minus 0.10 in [3 mm]. If the final average PTL is deficient by more than the PTL minus 0.10 in [3 mm], the Department will pay for the pavement in the PTL at the Contract unit price less the following monetary deductions in accordance with 1503 and Table 2301-14, excluding areas of defective pavement.

Table 2301-14
Deductions for Thickness Deficiencies

Thickness Deficiency Exceeding Permissible Deviations, *in [mm]*	Adjusted unit bid price per sq. yd [sq. m] of Payment
0.00 – ≤ 0.10 [≤ 3]	None (tolerance)
0.10 – ≤ 0.20 [3 – ≤ 5]	$0.20 [$0.25]
0.20 – ≤ 0.30 [5 – ≤ 8]	$0.40 [$0.50]
0.30 – ≤ 0.40 [8 – ≤ 10]	$0.70 [$0.90]
0.40 – ≤ 0.50 [10 – ≤ 13]	$1.00 [$1.25]
0.50 – ≤ 1.00 [13 – ≤ 25]*	$20.00 [$25.00]
* Perform exploratory coring as required by the Engineer.	

After Department thickness verification, the Department will test all of the cores for compressive strength at 60 days of age. The Department will test three of the cores from the entire Project for rapid chloride permeability (RCP) in lieu of compressive strength testing for information only.

O Opening Pavement to Traffic

Do not open a new pavement slab to general public traffic or operate paving or other heavy equipment on it until the concrete has attained an age of 7 days, or has reached a minimum flexural strength meeting the requirements of Table 2301-15 or minimum compressive strength of 3000 psi (20.6 Mpa), as approved by the Engineer. If the pavement joints are widened, seal the joints before operating paving or other heavy equipment and general public traffic on the pavement.

Cast the control specimens in accordance with 2461.4A5. Cure the control specimens in the same manner and under the same conditions as the pavement represented. The Engineer will test the control specimens in accordance with 2461.4A5.

Table 2301-15
Minimum Strength Requirements for Opening Pavements to Construction and to General Public Traffic

Slab Thickness, *in [mm]*	Flexural Strength, *psi [Mpa]*
≤7.0 [175]	500 [3.4]
7.5 [190]	480 [3.3]
8.0 [200]	460 [3.2]
8.5 [215]	440 [3.0]
9.0 [225]	390 [2.7]
≥ 9.5 [240]	350 [2.4]

Perform operations on new pavement as approved by the Engineer and in accordance with the following:

(1) Construct a ramp to prevent damage to the pavement slab when moving on and off the pavement,
(2) Operate the paving equipment on protective mats to prevent damage to the pavement surface and joints. Sweep the pavement surface free of debris before placing the protective mats, and
(3) Operate equipment on a slab without causing damage. If damage results, suspend operations and take corrective action as approved by the Engineer. Do not operate the equipment wheels or tracks within 4 in [100 mm] of the slab edge.

2301.4 METHOD OF MEASUREMENT

A Concrete Pavement

If the Contract includes the Contract item *Concrete Pavement*, the Engineer will measure in accordance with the following:

(1) Measure the concrete pavement placed to a uniform cross-section thickness by the surface area of the pavement as constructed, including integrant curb;
(2) Verify the pavement thickness based on the final measurement of cores;
(3) Include measurements for concrete pavement without regard to grade, strength, or type of concrete, width, or thickness of the pavement in a single measurement, except if the Plans include a Contract item for high-early strength concrete; and
(4) Apply incentive or disincentive for *Concrete Pavement* based on the theoretical volume of concrete used, by multiplying the measured square yard [square meter] of concrete by the thickness shown on the plans.

B Place Concrete Pavement

If the Contract includes the Contract item *Place Concrete Pavement*, the Engineer will measure in accordance with the following:

(1) Measure concrete pavement placed to a variable cross-section thickness by area based on specified dimensions, including integrant curb. This measurement will represent the surface area of the pavement as constructed; and
(2) Verify the pavement thickness based on the lab measured cores.

B.1 Structural Concrete

If the Contract includes the Contract item *Structural Concrete*, the Engineer will measure in accordance with the following:

(1) Measure structural concrete placed to a variable cross-section thickness by volume;
(2) Verify the volume measurements from the computerized batch ticket printouts from the plant, as verified by cement cutoffs and the consideration of any waste;
(3) Include the volume of all specified concrete pavements into a single item without regard to grade, strength, width, or thickness of the concrete pavement, except if the Plans include a Contract item for high-early strength concrete, and
(4) Apply incentives or disincentives for *Structural Concrete* based on the cubic yard [cubic meter].

C Supplemental Pavement Reinforcement

The Engineer will measure supplemental pavement reinforcement over culverts, storm sewers, and water mains, by weight.

D Expansion Joints

The Engineer will separately measure dowelled expansion joints of each design designation as shown on the Plans by length along the joint line.

E Reinforcement Bars

The Engineer will not separately measure keyway bars, tie bars, taper steel, stopper bars, and other reinforcement bars.

F Integrant Curb

The Engineer will separately measure integrant curb of each design by length.

G Dowel Bars

The Engineer will measure dowel bars by the actual number of individual dowels placed. The Engineer will not measure dowels included in the Contract linear foot [meter] price for *Dowelled Expansion Joints, Design ___*.

H Concrete Coring

The Engineer will not separately measure the number of cores taken, identified, and delivered as required by the Contract or directed by the Engineer.

2301.5 BASIS OF PAYMENT

A Concrete Pavement

Unless the Plans include a separate Contract item for work incidental to *Concrete Pavement*, the Contract square yard [square meter] price for *Concrete Pavement* includes the cost of constructing the pavement, including the cost of batch materials and mixing operations; plant lab-office; producing the concrete; fine grading; forming, including all headers; furnishing and installing keyway and keyway bars, tie bars, taper steel, stopper bars, and other reinforcement bars; delivering; depositing; placing; spreading; screeding; vibration monitoring; finishing; curing; and protecting the concrete.

If the Plans include a separate Contract item for *Concrete Pavement High-Early* or if the Contractor requests high-early and the Engineer approves, the Department will not provide extra compensation for the production of high-early strength concrete. The Contract square yard [square meter] price for *Concrete Pavement High-Early* includes the cost of constructing the pavement, including the cost of batch materials and mixing operations; plant lab-office; producing the concrete; fine grading; forming, including all headers; furnishing and installing keyway bars, tie bars, taper steel, stopper bars, and other reinforcement bars; delivering; depositing; placing; spreading; screeding; vibration monitoring; finishing; curing; and protecting the concrete.

If the Plans do not include a separate Contract item for *Concrete Pavement High-Early* and the Engineer orders high-early concrete, the Department will pay for the additional cement at a rate of the invoice cost plus 15 percent.

B Place Concrete Pavement

Unless the Plans include a separate Contract item for work incidental to *Place Concrete Pavement*, the Contract square yard [square meter] price for *Place Concrete Pavement* includes the cost of constructing the pavement, including fine grading; forming, including all headers; furnishing and installing keyway and keyway bars, tie bars, taper steel, stopper bars, and other reinforcement bars; placing; spreading; screeding; vibration monitoring; finishing; curing; and protecting the concrete.

B.1 Structural Concrete

The Engineer will field calculate the volume of *Structural Concrete* and *Structural Concrete High Early* placed. Due to variations in the asphalt or asphalt bond breaker layer, the Contractor may request additional volume up to 102 percent of the Engineer's field calculated volume of *Structural Concrete*, *Structural Concrete High Early*, or both. The Engineer will verify additional volume of concrete from the computerized batch ticket printouts from the plant, with consideration of any waste. If the Engineer finds the Contractor's request for the additional volume valid, the Engineer will pay for the additional volume up to 102 percent of the calculated quantity. The Contract cubic yard [cubic meter] price for *Structural Concrete* and *Structural Concrete High-Early* includes the cost of producing, delivering, and depositing the concrete, including the cost of the batch materials and mixing operations and the plant-lab office. If the Plans include a separate Contract item for *Structural Concrete High-Early* or if the Contractor requests high-early and the Engineer approves, the Department will not provide extra compensation for the production of high-early strength concrete.

If the Plans do not include a separate Contract item for *Concrete Pavement High-Early* and the Engineer orders high-early concrete, the Department will pay for additional cement at a rate of the invoice cost plus 15 percent.

C Other Concrete Items

The Contract pound [kilogram] price for *Supplemental Pavement Reinforcement* includes the cost of furnishing and placing the metal reinforcement, including tie wires, supporting devices, and splicing.

The Contract linear foot [meter] price for *Dowelled Expansion Joints, Design* ___ includes the cost of constructing the joints complete in place as shown on the plans, including the costs of furnishing and placing dowel bar assemblies, filler, and sealer materials.

The Contract linear foot [meter] price for *Integrant Curb, Design* ___ includes the cost of forming and finishing the curb and protecting and curing the concrete.

The relevant Contract unit price for *Concrete Pavement* or *Place Concrete Pavement* includes the cost of coring, including the cost of material, labor, equipment, delivery, core hole filling, and traffic control.

The Department will pay for concrete pavement on the basis of the following schedule:

Item No.:	Item:	Unit:
2301.604	Concrete Pavement ___ in [___ mm]	square yard [square meter]
2301.604	Concrete Pavement ___ in [___ mm] High-Early	square yard [square meter]
2301.604	Place Concrete Pavement ___ in [___ mm]	square yard [square meter]
2301.511	Structural Concrete	cubic yard [cubic meter]
2301.513	Structural Concrete High-Early	cubic yard [cubic meter]
2301.608	Supplemental Pavement Reinforcement	pound [kilogram]
2301.603	Dowelled Expansion Joints, Design ___	linear foot [meter]
2301.538	Dowel Bar	each
2301.541	Integrant Curb, Design ___	linear foot [meter]

S-48 (2301) CONCRETE RUMBLE STRIPS

S-48.1 Concrete Rumble Strips shall be constructed as detailed in the plans. Rumble strips in concrete pavement shall not be constructed by milling of pavement.

S-48.2 MEASUREMENT AND PAYMENT

Measurement and payment will be made by the are of satisfactorily constructed Concrete Rumble Strips. Payment will be made under Item 230.14.604 (Concrete Rumble Strips) at the Contract bid price per square yard, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to construct the concrete rumble strips.

S-49 (2357) BITUMINOUS TACK COAT

SP2005-138.1

The provisions of MnDOT 2357 are hereby deleted and replaced with the following:

2357.1 DESCRIPTION

This work shall consist of the application of bituminous material (emulsion or liquid asphalt) on a bituminous or concrete pavement prior to paving a new lift of Hot Mixed Asphalt.

2357.2 MATERIALS

A Bituminous Material 3151

The bituminous material for tack coat will be limited to one of the following kinds of emulsified asphalt. However, the Engineer may authorize the use of medium cure cutback asphalt (MC-250) during the early and late construction season when it is anticipated the air temperature may drop below 32 degrees Fahrenheit.

Allowable grades are as follows:

Emulsified Asphalt
Anionic SS-1, SS-1h
Cationic CSS-1, CSS-1h

Cutback Asphalt
Medium Cure Liquid Asphalt MC-250

Only Certified Sources are allowed for use. MnDOT's Certified Source List is located at the following link: http://www.dot.state.mn.us/products/index.html.

2357.3 CONSTRUCTION REQUIREMENTS

A Restrictions

Tack coat operations shall be conducted in a manner that offers the least inconvenience to traffic, with movement in at least one direction permitted at all times without pickup or tracking of the bituminous material.

The tack coat shall not be applied when the road surface or weather conditions are unsuitable as determined by the Engineer. The daily application of tack coat shall be limited to approximately the area on which construction of the subsequent bituminous course can reasonably be expected to be completed that day.

B Equipment

The bituminous material shall be applied with a distributor meeting the requirements of 2321.3C1.

C Road Surface Preparations

At the time of applying bituminous tack coat material, the road surface shall be dry and clean and all necessary repairs or reconditioning work shall have been completed as provided for in the Contract and approved by the Engineer.

All objectionable foreign matter on the road surface shall be removed and disposed of by the Contractor as the Engineer approves.

Preparatory to placing an abutting bituminous course, the contact surfaces of all fixed structures and the edge of the in-place mixture in all courses at transverse joints and in the wearing course at longitudinal joints shall be given a uniform coating of liquid asphalt or emulsified asphalt, applied by methods that will ensure uniform coating.

D Application of Bituminous Tack Coat Material

Unless otherwise indicated in the Plans or provisions, the bituminous tack coat material shall be applied within the application rates shown below in Table 2357.3-D as based on pavement type or condition and type of bituminous material. The Engineer shall approve the time and rate of application. Only a MnDOT certified asphalt emulsion supplier is allowed to dilute the emulsion. When diluted, the supplier shall provide asphalt emulsion diluted 1 part emulsion to 1 part water. Dilution of asphalt emulsion in the field is not allowed. The Engineer may waive the tack coat requirement when multiple lifts are paved on the same day.

Table 2357.3-D
Tack Coat Application Rates

Pavement Type or Condition	Application Rate, liter/square meter [gallons/sy]		
	Undiluted Emulsion SS-1, SS-1H, CSS-1, CSS-1H	Diluted Emulsion (1 part Emulsion to 1 part water) [1] SS-1, SS-1H, CSS-1, CSS-1H	MC Cutback[2] MC-250
New HMA	0.14 – 0.23 [0.03 – 0.05]	0.28 – 0.46 [0.06 – 0.10]	0.14 – 0.23 [0.03 – 0.05]
Aged HMA[3] or Un-milled PCC	0.23 – 0.37 [0.05 – 0.08]	0.46 – 0.69 [0.10 – 0.15]	0.23 – 0.37 [0.05 – 0.08]
Milled HMA or Milled PCC	0.32 – 0.46 [0.07 – 0.10]	0.64 – 0.92[0.14 – 0.20]	0.32 – 0.46 [0.07 – 0.10]

1- As provided by the asphalt emulsion supplier
2- When approved by the Engineer
3- Older than 1 year

The temperature of the bituminous material at the time of application shall be approved by the Engineer, within the limits specified following:

SS-1, SS-1H, CSS-1, CSS-1H ..... 21 to 71°C (70 to 160° F)
MC-250 ..... 74 to 104°C (165 to 220° F)

Unless otherwise directed, sand shall be spread on the newly tacked surface at pedestrian crossings.

2357.5 BASIS OF PAYMENT

Payment for the accepted quantity of asphalt emulsion and cutback shall be at the Contract price per unit of measure for undiluted asphalt emulsion and neat cutback. Furnishing and applying sand on newly tacked surfaces at pedestrian crossings shall be at no expense to the Department with no direct compensation being made therefore. Should the Contract fail to include a Contract Item covering payment for the bituminous material used for tack coat, all costs of furnishing and applying bituminous tack coat

material will be included in the compensation provided for the bituminous mixture, with no measurement made of the bituminous material used and with no direct compensation being made therefore.

Payment for the tack coat will be made on the basis of the following schedule:

Item No.	Item	Unit
2357.502	Bituminous Material for Tack Coat	Liter (gallon)

S-50 (2360) PLANT MIXED ASPHALT PAVEMENT - MODIFIED

Mn/DOT 2360 is hereby deleted from the Mn/DOT Standard Specifications and replaced with the following
attached 2360 (Plant Mixed Asphalt Pavement) Specification and as modified herein:

S-50.1 The bituminous pavement shall be constructed in accordance with the provisions of 2360, except as modified below:

The mix design for bituminous overlays and surfacing will be based on the following aggregate types:

Bituminous Aggregates	(Gravel Intermediate)
Bituminous Aggregates	(Gravel Fine)
Bituminous Aggregates	(RAP)
Bituminous Aggregates	(Class A Coarse)
Bituminous Aggregates	(Class A Fine)

S-50.2 There shall be a minimum of five separately graded aggregate stockpiles, two for natural gravel and two for crushed Class A aggregate (three if 100% Class A aggregate is used), and one for RAP. The use of crushed limestone will not be permitted as an aggregate in the bituminous mix. 100% Class A aggregates will be permitted.

S-50.3 Each aggregate type must individually meet Mn/DOT 3139 quality requirements. Natural Gravel materials shall meet the Mn/DOT Specification 3139, Class C.

S-50.4 The Bituminous Aggregate materials shall meet the following gradation requirements:

Sieve Size (Inch)	Coarse Class A	Intermediate Class A	Fine Class A	Intermediate Natural Gravel	Fine Natural Gravel
1"	100	--	--	--	--
3/4"	85-100	--	--	--	--
5/8"	--	100	--	100	--
1/2"	--	85-100	--	95-100	--
3/8"	30-60	50-100	100	85-100	100
#4	0-8	0-15	40-80	60-80	95-100
#8	--	--	10-40	50-70	80-100
#16	--	--	0-10	40-60	55-85
#30	--	--	--	30-50	30-60
#50	--	--	0-5	15-30	15-30
#100	--	--	--	5-15	5-15
#200	--	--	--	3-9	3-10

S-50.5 Asphalt Binder Material . . . . . .

AASHTO M320

The PG grade for each project shall be as shown on the individual plans.

S-50.6 Delete Table 2360-3

S-50.7 Field Tensile Strength Ratio (TSR) - ASTM D4867-92, Mn/DOT Modified
If the Tensile Strength Ratio (TSR) does not meet the minimum test requirements, the Contractor shall provide anti-strip additive at no additional cost to the County or modify their aggregate sources so as to meet the minimum requirements.

S-50.8 2360.2 Mixture Design
The mixture design shall be in accordance with the requirements of 2360.2, except as modified below:

S-50.9 The Contractor shall provide to the County information on the aggregate design, including gradations and quality of each aggregate type prior to mix design. The County shall be notified two days or more in advance of sampling and have the opportunity to be present when the samples are taken. The County will determine the aggregate mix design alternatives to be carried to the mix design process.

S-50.10 The Contractor shall provide all information on each mix design to the County. The County will determine the final JMF.

S-50.11 The Contractor shall provide separate mix designs for 1" and for 1 ½" or thicker bituminous layer thicknesses.

S-50.12 The Contractor shall produce a mixture of uniform composition closely conforming to the approved JMF to ensure the mixture when compacted will achieve the specified properties. During production the Contractor shall provide the County with mix design text results. The County may revise the JMF within the limits in Table 2360-7 without redesign of the mixture. The Contractor shall not revise the JMF without prior County Approval.

S-50.13 Further adjustments to the JMF without redesign may be requested by the Engineer or the Contractor because of unsatisfactory results. The Adjusted Asphalt Film Thickness of the mixture and the fines to asphalt ratio shall be reviewed prior to an approval of this adjustment by the Engineer.

S-50.14 Paragraphs 2360.2-G.10 through 2360.2-G.14.h are hereby deleted.

S-50.15 Recycled Asphaltic Pavement Materials (RAP), Recycled Asphalt Shingles (RAS), Crushed Concrete and Salvaged Aggregate shall not be used in maintenance overlays or wearing courses.

S-50.16 Recycled Asphaltic Pavement Materials (RAP) will be permitted only in the non-wear courses at a maximum rate of 20 percent. Recycled Asphalt Shingles (RAS), Crushed Concrete and Salvaged Aggregate will not be permitted in the non-wear courses.

S-50.17 Construction Requirements
Construction requirements will be in accordance with 2360.3 and the following:

S-50.18 The centerline joint will be closed at the end of each paving day by paving adjacent lanes unless the County agrees it is not feasible.

S-50.19 In addition to a paver being used to place the mainline bituminous mixtures, Contractor shall furnish and use a separate paver for placing all driveways, intersections, and other areas not on the mainline. This work shall be done in conjunction with the placing of all mainline bituminous materials (Wearing and Non-wearing Courses) unless otherwise directed by the Engineer. Using the mainline paver for this work (during mainline

production) will not be permitted. When a second paver is required by the Engineer for use on the mainline paving, all electronic grade controls shall be in satisfactory working condition. In the case of matching existing surfaces on both sides of the paver a joint matching device will be required on both sides of the paver for reference control in matching existing surface grades at joints.

S-50.20 The Contractor's paver shall be equipped with two Trans-Tech Joint Makers or approved equivalent joint compacting devices. This unit shall be considered to be a part of the paver and no other direct compensation will be made therefore.

S-50.21 A pick-up machine will be required to be used in front of the paver unless previously approved by the Engineer.

S-50.22 A skidloader will be required for all approach grading. A motor grader will not be allowed unless previously approved by the Engineer.

S-50.23 All necessary work needed in preparing driveways, field approaches, intersections, and any other area designated by the Engineer shall be done by the Contractor with no direct payment being made therefore.

Compaction Operations

S-50.24 Compaction shall be obtained by the Ordinary Compaction Method in accordance with specification 2360.3-D.2 and the following:

S-50.25 Contractor shall be required to use three individual rollers for compaction. Vibratory steel for breakdown, pneumatic shall be used for intermediate rolling, and a steel static roller for finish rolling. All rollers shall be self-propelled and shall meet the requirements of specification 2360 as pertains to rollers. All the rollers shall be equipped with spray attachments for moistening all rolling surfaces on both the front and back. Contractor may be required to add liquid detergent to water. The vibratory steel rollers shall have a minimum total weight of 8 tons.

Measurement and Payment

S-50.26 Measurement of aggregate material used for production of wearing, binder, and base course mixture shall be based on the weight of each material used as required by the mix design current at the time of production.

S-50.27 Basis of payment shall be made in accordance with the provisions as shown below:

Separate payment will be made for Gravel Intermediate Aggregate, Gravel Fine Aggregate, RAP, Class "A" Coarse Aggregate, Class "A" Intermediate Aggregate, and Class A Fine Aggregate. Payment for the aggregate will be based on tons required by the mix design current at the time of production and at the unit bid price for each type of material. Payment for aggregate will not be made based on tons of material produced or placed in a stockpile. Payment for the bituminous material for mixture and produce, haul, and lay will be made based on actual tons used at the unit bid price for each type of material.

Measurement and Payment will be based on the following schedule:

Item No.	Description	Unit
2360.609	Bituminous Material for Mixture (PG XX-XX)	Ton
2360.609	Bituminous Aggregate (Gravel Intermediate)	Ton
2360.609	Bituminous Aggregate (Gravel Fine)	Ton
2360.609	Bituminous Aggregate (RAP)	Ton
2360.609	Bituminous Aggregate (Class "A" Coarse)	Ton
2360.609	Bituminous Aggregate (Class "A" Fine)	Ton
2360.609	Bituminous (Produce, Haul, & Lay)	Ton

S-50.28 Item No. 1903, Compensation for Increased or Decreased Quantities, shall not apply to this work and any excess material upon completion of this project, shall not be measured for payment.

S-50.29 No incentive / disincentive payment will be made for Density, Ride, AFT, or Centerline Joint Density.

S-50.30 The sentence "In addition to the list the above pavement surface must meet requirements of 2399 (Pavement Surface Smoothness) requirements." is deleted from 2360.3.E Surface Requirements of the attached 2360 (Plant Mixed Asphalt Pavement) Specification. The requirements of 2360.3.E Surface Requirements will apply.

S-51 (2501) PIPE CULVERTS

SP2005-150

This work consists of furnishing and installing pipe culverts and fittings in accordance with the Plans, the applicable MnDOT Standard Specifications, Section 12 of the AASHTO LRFD Bridge Design Specifications, the attached detail "PLASTIC PIPE INSTALLATION REQUIREMENTS", and the following:

S-51.1 MEASUREMENT

Measurement will be made by the length of pipe culvert furnished and installed as specified.

S-51.2 PAYMENT

Payment for pipe culverts will be made in accordance with the schedule set forth below at the appropriate Contract unit bid price for each separate item of work, which shall, in each instance, be compensation in full for the costs of all materials, equipment, and labor required to complete the work as specified, to the satisfaction of the Engineer.

Item No.	Description	Unit
2501.603	___ mm [__"] Pipe Culvert	meter [linear foot]

S-52 (2502) PIPE DRAIN CLEANOUT

This work shall consist of constructing pipe drain cleanouts in accordance with the applicable provisions of Mn/DOT 2502, the details in the Plan, and these Special Provisions.

S-52.1 MATERIAL REQUIREMENTS

Pipe Drain Cleanout pipe and fittings shall be Thermoplastic (TP) Pipe, Mn/DOT 3245. Caps shall be screw on either metal or Thermoplastic. If Thermoplastic caps are used an 18" metal pin/rod shall be installed adjacent to the cap for locating purposes.

S-52.2 MEASUREMENT AND PAYMENT

Measurement will be made for cleanouts by each furnished and satisfactorily installed of 4" PVC Pipe Drain Cleanout approved by the Engineer. Payment will be made under Item 2502.602. 4" PVC Pipe Drain Cleanout at the Contract bid price per each cleanout installed, which shall be full compensation for furnishing and installing the item as detailed in the plan.

S-53 (2502) SUBSURFACE DRAINS, SUBCUT DRAIN TYPE - MODIFIED

SP2005-161

This work shall consist of constructing subcut drains in accordance with the applicable provisions of MnDOT 2502, the "option" details in the Plan, and these Special Provisions. This drain is intended to collect and discharge infiltration water that may accumulate in the bottom of granular-backfilled subcuts. Subcut drains may also be used to control high groundwater conditions.

Unless otherwise specified, the Contractor may choose either of two options for the construction of these drains: Option 1, thermoplastic pipe may be placed in the bottom corner of the subcut and then the subcut backfilled; Option 2, the subcut is first backfilled and then PE pipe is placed by machine trencher.

S-53.1 MATERIAL REQUIREMENTS

Subcut drain pipe shall be 100 mm [4 inch] perforated Thermoplastic (TP) Pipe, MnDOT 3245, for Design Option One (1) or 100 mm [4 inch] perforated Corrugated Polyethylene (PE) Tubing, MnDOT 3278, for Design Option Two (2). Pipe in both designs shall NOT be wrapped with Geotextile, MnDOT 3733, Type I. Coarse Filter Aggregate shall meet the requirements of MnDOT 3149.

S-53.2 CONSTRUCTION REQUIREMENTS

(A) Subcut drains may connect directly to permanent drainage structures or be outletted to the ditch via a discharge pipe and headwall. Where so specified, connections to drainage structures shall be incidental work and shall meet the approval of the Engineer.

Pipe shall generally be placed according to the Plan details, but other configurations may be approved by the Engineer to accomplish the desired results. Unless otherwise specified, drain grades shall not be less than 0.2 percent and outlets to the ditch shall be at low points or at a maximum spacing of 152.4 m [500 feet]. Structure outlets may be at maximum spacings of 243.8 m [800 feet], provided both ends of the pipe are tied to structures. The Contractor shall supply and use laser grade control equipment when placing all TP pipe and for PE pipe when pipe grades do not follow working grades at a constant depth.

(B) Design Option One (1)

The Contractor shall place 100 mm [4 inch] perforated Thermoplastic (TP) Pipe in the bottom of the subcut according to the design typical. At least 300 mm [12 inches] of subcut backfill shall be placed above the pipe before any compactive effort is applied.

Pipe may be furnished with either bell and spigot or sleeve couplings and either gasket or solvent joints. All solvent joints shall be left uncemented unless cement is specifically requested by the Engineer. The ends shall be appropriately marked showing the depth of the bell or sleeve, so that both the Engineer and workers can easily ascertain that the joint has been fully coupled. Perforations shall be laid down. Connections to drainage structures shall be composed of angle fittings not to exceed 22-1/2 degrees.

(C) Design Option Two (2)

The Contractor shall place 100 mm [4 inch] perforated Corrugated Polyethylene (PE) Tubing after the subcut is partially or totally backfilled.

Drains shall be placed by machine trencher capable of cutting the trench, shaping the trench bottom to cradle the lower one-third of the pipe, laying the pipe, and backfilling with filter aggregate in one simultaneous and continuous operation. Plowing will not be permitted. The trenching head shall be equipped with a shield to prevent adjacent material from caving. Trench width shall be 200 mm [8 inch] minimum, 250 mm [10 inch] maximum, with pipe being centered therein.

The trench shall be backfilled with Coarse Filter Aggregate. Filter aggregate shall be free-flowing and receive vibratory compaction to the satisfaction of the Engineer. In addition to the required trench compaction, at least one pass of general compaction (as directed by the Engineer) shall be made over the trench prior to placing the overlying required pavement structure.

The trenching operation may be performed anytime after at least 600 mm [24 inches] of subcut backfill has been placed and compacted. If the trenching is not done until the subcut is completely backfilled, only the lowermost 600 mm [24 inches] of the trench need be backfilled with Coarse Filter Aggregate. The remaining trench fill shall be similar to that required for the subcut and care must be taken to achieve satisfactory density.

S-53.3 MEASUREMENT AND PAYMENT

Measurement will be made by the length of furnished and satisfactorily installed Subsurface Drain, Subcut Drain Type, approved by the Engineer. Regardless of option chosen, payment will be made under

Item 2502.541 (100 mm [4"] Perforated TP Pipe Drain) at the Contract bid price per meter [linear foot], which shall be full compensation for pipe, furnished and installed as specified, filter aggregate backfill and compaction, and all other associated work.

S-54 (2503) SANITARY SEWER CONSTRUCTION

S-54.1 Sanitary sewer construction shall conform to the applicable provisions of the "Standard Utilities Specifications for Watermain and Service Line Installation and Sanitary Sewer and Storm Sewer Installation" as published by the City Engineers Association of Minnesota, (CEAM) 1999 Edition.

S-54.2 Copies of the Standard Utilities Specifications are available for download from the website at: http://ceam.govoffice.com/

S-54.3 References to the standard specifications shall serve to supplement or modify the referenced specification. Portions of referenced specifications not specifically affected by the supplemented information of modification shall remain in effect as originally written.

S-54.4 Should discrepancies arise between the CEAM and Mn/DOT Specifications for storm sewer construction, the Mn/DOT Specifications shall govern.

S-55 (2503) RECONSTRUCT SANITARY MANHOLES

S-55.1 Work for this item shall be done in accordance with the Standard Utility Specifications prepared by the City Engineers Association of Minnesota, latest edition.

S-55.2 This work shall consist of removing the existing manhole casting and rings, removing the existing concrete cover slab or cone, removing or furnishing and installing the necessary manhole sections, and reinstalling a concrete cover slab or cone, and installing the salvaged casting to final grade.

S-55.3 Pre-cast manhole joints shall be rubber O-ring gasket type to match existing joint.

S-55.4 In absence of the O-ring joint, older style manhole joints shall be sealed using a material similar to Ram-Nek or equal gasket material applied in accordance with manufacturer's recommendation.

S-55.5 Payment for this work will be under item Reconstruct Sanitary Manholes (2503.603) at the Contract unit price per LIN FT of new manhole installed and shall be compensation in full for all equipment, labor and materials necessary to complete the work as specified.

S-56 (2503) SANITARY SEWER MANHOLES

This work consists of supplying and installing sanitary sewer manholes in accordance with the applicable Mn/DOT Standard Specifications and the following:

S-56.1 Sanitary Manholes shall conform to details as shown in the plan, and the Standard Utilities Specifications prepared by the City Engineers Association of Minnesota, 1999 edition.

S-56.2 Payment for this work will be under item Construct Sanitary Manhole (2506.603) at the Contract unit price per lineal foot completed and shall be compensation in full for all equipment, labor and materials necessary to complete the work as specified.

S-57 (2503) CONNECT TO EXISTING SANITARY SEWER

This work consists of constructing connections into existing sanitary sewers in accordance with the applicable Mn/DOT Standard Specifications and the following:

S-57.1 Measurement will be made by the number of connections constructed as specified. Payment will be under Item 2503.602 (Connect to Existing Sanitary Sewer) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to

connect the proposed storm sewer structure to the existing storm sewer pipe. Any damage caused to the existing storm sewer structure shall be repaired at no expense to the Department and to the satisfaction of the Engineer

S-58 (2503) PVC PIPE SEWER

This work consists of constructing sanitary sewer in accordance with the applicable Mn/DOT Standard Specifications the CEAM Standard Specifications and the following:

S-58.1 Payment for sanitary sewer of each type and diameter will be made in accordance with the schedule set forth below at the appropriate Contract bid price for the specified unit of measure. Such payment, in each instance, shall be compensation in full for all costs incidental thereto including, but not limited to: (1) trench excavation, (2) granular bedding, (3) tracer wire, (4) testing, and (5) compaction, together with any other expenses incurred in completing the work that is not specifically included for payment under other Contract Items.

S-58.2 PVC Pipe Sewer shall be DR 35

S-58.3 Tracer wire shall meet the requirements one of the following:
A) 1/8" galvanized aircraft wire clear PVC coated to 3/16".
B) 1/8" 304 stainless steel wire clear PVC coated to 3/16".
C) #12AWG solid copper or copper clad steel (CCS) wire with 30mil high density polyethylene (HDPE insulating jacket.

ITEM NO.	DESCRIPTION	UNIT
2503.603	8" PVC Pipe Sewer	LIN FT

S-59 (2503) PIPE SEWERS

SP2005-167

This work shall consist of furnishing and installing pipe sewers and fittings in accordance with the Plans, the applicable MnDOT Standard Specifications, Section 12 of the AASHTO LRFD Bridge Design Specifications, the attached detail "PLASTIC PIPE INSTALLATION REQUIREMENTS", and the following:

S-60 (2504) (CEAM 2611) ADJUST VALVE BOX - WATER

SP2005-175

This work shall consist of adjusting existing valve boxes to new surface elevations without changing the elevation of the valves. The work shall be performed to the satisfaction of the Engineer in accordance with the following:

S-60.1 Measurement will be made by the number of boxes adjusted. Payment will be made under Item 2504.602 (Adjust Valve Box - Water) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto including, but not limited to, furnishing extensions as required and replacing any materials damaged by the Contractor's operations.

S-61 (2504) (CEAM 2611) RELOCATE HYDRANT AND VALVE

SP2005-179

This work shall consist of relocating hydrants and valves with housings after extending the leads or moving the leads, at a location outside of the roadbed, as directed by the Engineer, in accordance with the following:

S-61.1 All additional materials furnished under this specification shall be new and like in kind to that in place.

S-61.2 Prior to relocation, the hydrant and gate valve shall be cleaned of all foreign matter and after installation shall be disinfected in accordance with the procedures described in paragraphs No.'s 1227 and 1228 of Section XII "Manual of Water Supply Sanitation" of the Minnesota Department of Health.

S-61.3 Hydrant and valve relocation will be measured by the number of hydrants installed complete with gate valve and housing as specified. Payment will made under Item 2504.602 (Relocate Hydrant and Valve) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto including, but not limited to, any additional water leads, drain pits, concrete blocking, extensions, risers or fittings necessary to complete the relocation.

S-62 (2504) POLYSTYRENE INSULATION - MODIFIED

SP2005-181

This work shall consist of furnishing and installing insulation board at the locations designated in the Plan. This work shall be performed in accordance with the details shown in the Plans, the applicable MnDOT Standard Specifications, and the following:

S-62.1 The insulation board shall be rigid expanded polystyrene conforming to the material requirements of MnDOT 3760. Styrofoam S.M. and Styrofoam TG brand insulation is an approved insulation material.

S-62.2 The insulation material shall be furnished in panels 2 inches thick and shall be placed on a smooth level foundation in a staggered manner that will provide joint overlaps a minimum of 150 mm [6 inches] on the underlying sheets and the edges shall be trim and square.

S-62.3 The placement of the backfill material over the insulation board and compaction thereof shall be accomplished in a manner that will preclude damage to the insulation material. Construction equipment of any kind shall not operate directly on the insulation board. Sections of insulation board damaged by the Contractor's construction operations shall be replaced at the Contractor's own expense.

S-62.4 Measurement will be made by the area insulated as specified. Payment will be made under Item 2504.604 (4" Polystyrene Insulation) at the Contract bid price per square meter [square yard], which shall be compensation in full for all costs incidental thereto.

S-63 (2506) MANHOLES AND CATCH BASINS

SP2005-184

MnDOT 2506 is hereby modified and/or supplemented with the following:

S-63.1 A 100 mm [4 inch] thick concrete encasement shall be placed around the outside of the manhole or catch basin as detailed in current MnDOT Standard Plate 4026. This encasement shall be placed at the time of final casting placement and shall be incidental for which no payment will be made.

S-63.2 Adjusting Rings manufactured from High Density Polyethylene (H.D.P.E.) are approved as an alternate to concrete adjusting rings. It is important that the H.D.P.E. adjusting ring be sealed with the product recommended by the manufacturer.

S-64 (2506) OUTLET CONTROL STRUCTURE

This work shall consist of supplying and installing an outlet control structure in accordance with the applicable MNDOT Standard Specification for the following:

S-64.1 Outlet Control structure shall conform to details as shown in the plan.

S-64.2 Payment for this work will be under Outlet Control Structure (2506.602) at the Contract unit price per EACH completed and shall be compensation in full for all equipment, labor and materials necessary to complete the work as specified.

S-65 (2506) ADJUST TILE INLET

This work consists of raising or lowering an existing tile inlet structure in accordance with the applicable Mn/DOT Standard Specifications and the following:

S-65.1 Measurement will be made by the EACH of tile inlets adjusted. Payment will be made under Item 2506.602 (Adjust Tile Inlet) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to remove or install additional inlet extension material and providing for a soil tight seal to the existing inlet material. Any damage caused to the existing tile inlet structure shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

S-66 (2511) RANDOM RIPRAP – CL III - MODIFIED

Riprap shall be furnished in accordance with the provisions of 2511 and the following:

S-66.1 The Contractor shall place riprap at locations shown in the plan and to dimensions as directed by the Engineer. The use of salvaged concrete materials will not be permitted for use as riprap. Riprap will be paid for by in-place volume of the material based on the surface dimensions staked and the specified thickness. Payment will not be made by weight of material basis.

S-66.2 The unit price of riprap shall include the furnishing and placement of Granular Filter under the entire riprap areas. Granular Filter Material shall be considered incidental with no direct payment made therefore. Geotextile Fabric will not be allowed as a substitution for Granular Filter Material.

S-67 (2521) WALKS

(2012 Version (Rev. 1/18/12))
SP2005-191

The provisions of MnDOT 2521 are modified in accordance with the following:

S-67.1 MnDOT 2521.3C3 is hereby modified to include the following provision:

After completing final finishing operations, cure all exposed concrete surfaces. Use one of the following curing methods:

(1) Place the membrane curing compound conforming to 3754 or 3755 within 30 minutes of concrete placement or once the bleed water has dissipated, unless the Engineer directs otherwise in accordance with 2521.3.E.1.a. Place the membrane curing compound on the edges within 30 minutes after permanent removal of the forms or curing blankets, unless the Contract requires otherwise.

(2) Place plastic curing blankets or completely saturated burlap curing blankets as soon as practical without marring the surface in accordance with 2521.3.E.1.b.

Failure to comply with these provisions will result in the Engineer applying a monetary deduction in accordance with 1503. When there is not a separate Contract unit price for Structural Concrete, the Department will apply a monetary deduction of $50.00 per cu. yd [$65.00 per cu. m] or 50 percent of the Contractor-provided invoice amount for the concrete in question, whichever is less.

Whenever weather conditions are such as to cause unusual or adverse placing and finishing conditions, expedite the application of a curing method or temporarily suspend the mixing and placing operations, as the conditions require.

If necessary to remove the coverings to saw joints or perform other required work, and if the Engineer approves, remove the covering for the minimum time required to complete that work.

C3a Curing Methods

C3a(1) Membrane Curing Method

Before application, agitate the curing compound as received in the shipping container to obtain a homogenous mixture. Protect membrane curing compounds from freezing before application. Handle and apply the membrane curing compound in accordance with the manufacturer's recommendations.

Apply the curing compound with an approved airless spraying machine in accordance with the following:

(1) At a rate of 1 gal per 150 sq. ft (1 L per 4 m²) of surface curing area.
(2) Apply homogeneously to provide a uniform solid white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper). Some MnDOT approved curing compounds may have a base color (i.e. yellow) that cannot comply with the above requirement. In this case, provide a uniform solid opaque consistency meeting the intent of the above requirement.
(3) If the curing compound is damaged during the curing period, immediately repair the damaged area by re-spraying.

The Engineer will approve the airless spraying machine for use if it is equipped with the following:

(1) A re-circulating bypass system that provides for continuous agitation of the reservoir material,
(2) Separate filters for the hose and nozzle, and
(3) Multiple or adjustable nozzle system that provides for variable spray patterns.

If the Engineer determines that the initial or corrective spraying may result in unsatisfactory curing, the Engineer may require the Contractor to use the blanket curing method, at no additional cost to the Department.

C3a(2) Curing Blanket Method

After completion of the finishing operations and without marring the concrete, cover the concrete with curing blankets. Install in a manner that envelops the exposed concrete and prevents loss of water vapor. After the concrete has cured, apply membrane curing compound to the concrete surfaces that will remain exposed in the completed work.

C3b Protection Against Rain

Protect the concrete from damage due to rain. Have available, near the site of the work, materials for protection of the edges and surface of concrete. Should any damage result, the Engineer will suspend operations until the Contractor takes corrective action and may subject the rain-damaged concrete to 1503 and 1512.

C3c Protection Against Cold Weather

If the national weather service forecast for the construction area predicts air temperatures of 36 °F [1 °C] or less within the next 24 h and the Contractor wishes to place concrete, submit a cold weather protection plan.

Protect the concrete from damage including freezing due to cold weather. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the damaged concrete to 1503 and 1512.

C3c(1) Cold Weather Protection Plan

Submit proposed time schedule and plans for cold weather protection of concrete in writing to the Engineer for acceptance that provides provisions for adequately protecting the concrete during placement and curing. Do not place concrete until the Engineer accepts the cold weather protection plans.

S-67.2 MnDOT 2521.3E is hereby deleted and replaced with following:

E Backfilling

Protect newly placed concrete from damage by adjacent vibratory or backfilling operations for a minimum of 24 hours. Perform vibratory operations and backfilling 72 hours after placing the concrete or after the concrete reaches a compressive strength of at least 3,000 psi [20.7 Mpa]. The Engineer will cast, cure, and test the concrete control specimens in accordance with 2461.3G5. If damage results from any of these operations the Engineer will suspend all operations until corrective action is taken and a new method is approved. The Engineer may subject damaged concrete to 1503 and 1512.

The Contractor may hand operate concrete consolidation equipment and walk behind vibratory plate compactors 24 hours after placing the concrete, and other equipment as approved by the Engineer in conjunction with the Concrete Engineer.

After curing, backfill or perform embankment construction to the elevations shown on the plans, without damaging the concrete. Use suitable grading materials from the excavation for backfill material in accordance with 2105, unless otherwise required by the Contract. Place and compact the backfill material in accordance with 2105.

Dispose of surplus excavated materials in accordance with 2105.

S-68 (2531) CONCRETE CURBING

(2012 Version)
SP2005-191.1

The provisions of MnDOT 2531 are supplemented and/or modified with the following:

S-68.1 The last paragraph of MnDOT 2531.3C shall be deleted and replaced with the following:

Longitudinal construction joints between a concrete median or gutter section and a concrete pavement shall not be sawed or sealed.

S-68.2 MnDOT 2531.3G is hereby modified to include the following provision:

After completing final finishing operations, cure all exposed concrete surfaces. Use one of the following curing methods:

(1) Place the membrane curing compound conforming to 3754 or 3755 within 30 minutes of concrete placement or once the bleed water has dissipated, unless the Engineer directs otherwise in accordance with 2521.3.E.1.a. Place the membrane curing compound on the edges within 30 minutes after permanent removal of the forms or curing blankets, unless the Contract requires otherwise.
(2) Place plastic curing blankets or completely saturated burlap curing blankets as soon as practical without marring the surface in accordance with 2521.3.E.1.b.

Failure to comply with these provisions will result in the Engineer applying a monetary deduction in accordance with 1503. When there is not a separate Contract unit price for Structural Concrete, the Department will apply a monetary deduction of $50.00 per cu. yd [$65.00 per cu. m] or 50 percent of the Contractor-provided invoice amount for the concrete in question, whichever is less.

Whenever weather conditions are such as to cause unusual or adverse placing and finishing conditions, expedite the application of a curing method or temporarily suspend the mixing and placing operations, as the conditions require.

If necessary to remove the coverings to saw joints or perform other required work, and if the Engineer approves, remove the covering for the minimum time required to complete that work.

G1 Curing Methods

G1a Membrane Curing Method

Before application, agitate the curing compound as received in the shipping container to obtain a homogenous mixture. Protect membrane curing compounds from freezing before application. Handle and apply the membrane curing compound in accordance with the manufacturer's recommendations.

Apply the curing compound with an approved airless spraying machine in accordance with the following:

(1) At a rate of 1 gal per 150 sq. ft (1 L per 4 m^2) of surface curing area.
(2) Apply homogeneously to provide a uniform solid white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper). Some MnDOT approved curing compounds may have a base color (i.e. yellow) that cannot comply with the above requirement. In this case, provide a uniform solid opaque consistency meeting the intent of the above requirement.
(3) If the curing compound is damaged during the curing period, immediately repair the damaged area by re-spraying.

The Engineer will approve the airless spraying machine for use if it is equipped with the following:

(1) A re-circulating bypass system that provides for continuous agitation of the reservoir material,
(2) Separate filters for the hose and nozzle, and
(3) Multiple or adjustable nozzle system that provides for variable spray patterns.

If the Engineer determines that the initial or corrective spraying may result in unsatisfactory curing, the Engineer may require the Contractor to use the blanket curing method, at no additional cost to the Department.

G1b Curing Blanket Method

After completion of the finishing operations and without marring the concrete, cover the concrete with curing blankets. Install in a manner that envelops the exposed concrete and prevents loss of water vapor. After the concrete has cured, apply membrane curing compound to the concrete surfaces that will remain exposed in the completed work.

G2 Protection Against Rain

Protect the concrete from damage due to rain. Have available, near the site of the work, materials for protection of the edges and surface of concrete. Should any damage result, the Engineer will suspend operations until the Contractor takes corrective action and may subject the rain-damaged concrete to 1503 and 1512.

G3 Protection Against Cold Weather

If the national weather service forecast for the construction area predicts air temperatures of 36 °F [1 °C] or less within the next 24 h and the Contractor wishes to place concrete, submit a cold weather protection plan.

Protect the concrete from damage including freezing due to cold weather. Should any damage result, the Engineer will suspend operations until corrective action is taken and may subject the damaged concrete to 1503 and 1512.

G3a Cold Weather Protection Plan

Submit proposed time schedule and plans for cold weather protection of concrete in writing to the Engineer for acceptance that provides provisions for adequately protecting the concrete during placement and curing. Do not place concrete until the Engineer accepts the cold weather protection plans.

S-68.3 MnDOT 2531.3J is hereby deleted and replaced with the following:

J Backfilling

Protect newly placed concrete from damage by adjacent vibratory or backfilling operations for a minimum of 24 hours. Perform vibratory operations and backfilling 72 h after placing the concrete or after the concrete reaches a compressive strength of at least 3,000 psi [20.7 Mpa]. The Engineer will cast, cure, and test the concrete control specimens in accordance with 2461.3G5. If damage results from any of these operations the Engineer will suspend all operations until corrective action is taken and a new method is approved. The Engineer may subject damaged concrete to 1503 and 1512.

The Contractor may hand operate concrete consolidation equipment and walk behind vibratory plate compactors 24 hours after placing the concrete, and other equipment as approved by the Engineer in conjunction with the Concrete Engineer.

After curing, backfill or perform embankment construction to the elevations shown on the Plans, without damaging the concrete. Use suitable grading materials from the excavation for backfill material in accordance with 2105, unless otherwise required by the Contract. Place and compact the backfill material in accordance with 2105.

Dispose of surplus excavated materials in accordance with 2105.

S-69 (2531) TRUNCATED DOMES

This work consists of constructing pedestrian curb ramps with Truncated Dome Systems (detectable warning surfaces) in compliance with the ADA Accessibility Guidelines (ADAAG). This work shall be performed in accordance with the applicable Mn/DOT Standard Specifications, the details in the Plan, and the following:

S-69.1 The Contractor shall select a truncated dome product from the approved products list at http://www.mrr.dot.state.mn.us/materials/materials.asp. Only approved products are allowed. Stamped concrete isnot allowed.

S-69.2 All truncated dome systems shall be installed in strict accordance with the recommendations of the manufacturer. The installation protocol shall include details regarding product specific construction requirements and how the system will be sealed to mitigate freeze/thaw damage through moisture intrusion. The Contractor shall provide this information to the Engineer for approval two weeks prior to commencement of work.

S-69.3 The entire truncated dome area typically 2 feet x 4 feet shall contrast visually from the adjacent walking surfaces. The entire truncated dome area shall be a light color (light gray or buff typically) when the adjacent side walk is a dark color. The entire truncated dome area shall be a dark color (red or dark gray typically) when the adjacent sidewalk is a "white" or light gray cement color. The Engineer will determine the colors when the

pavement is dry (everything looks dark when it rains). Other colors may also provide a dark on light or light on dark contrast and may be used with approval of the Engineer.

S-69.4 At the time of construction, all Truncated Dome Systems are specified to be in dimensional and alignment compliance with the requirements of the ADAAG as detailed in the Plan.

S-69.5 No measurement will be made of the number of pedestrian curb ramps installed as specified in the ADAAG. All work necessary to the installation of the pedestrian curb ramps with the exception of the truncated dome area will be paid for as concrete walk.

S-69.6 The truncated dome area will be measured by the square meter [square foot]. Payment will be made under Item 2531.604 (Truncated Domes) at the Contract bid price per square meter or Item 2531.618 (Truncated Domes) at the Contract bid price per [square foot], which shall be compensation in full.

S-70 (2540) RELOCATE MAIL BOX SUPPORT

SP2005-200

This work shall consist of relocating existing mailbox supports in accordance with the applicable MnDOT Standard Specifications, Standard Plate 9350A, and the following:

S-70.1 It is the Contractor's responsibility to coordinate with the local postal authority as to where the temporary location(s) shall be and to notify the postal patrons of the locations.

S-70.2 The inplace mail box, or a new mail box if furnished by the owner, attached distribution box and/or sign, if present, shall be salvaged and installed at the new location as staked in the field by the Contractor. All depressions resulting from the relocation process shall be filled.

All relocation operations shall be done in such a manner so as to cause no interruption of mail delivery if at all possible. In no case shall the owner or resident be without a mailbox installation for more than 24 hours.

S-70.3 Measurement will be made by the number of Mail Box Supports relocated, as specified in the Plan. Payment will be made under Item 2540.602 (Relocate Mail Box Support) at the Contract bid price per each, which shall include but not be limited to all items as specified above, except those that the Contract specifically designates as having been included for payment under separate items.

S-71 (2554) INSTALL3-CABLE GUARDRAIL

SP2005-201

This work shall consist of installing a previously salvaged 3-cable guardrail in accordance with the applicable provisions of Mn/DOT 2554, as recommended by the manufacturer, as directed by the Engineer, and the following:

S-71.1 Install 3-cable guardrail includes, but not limited to, placement of posts, rails, breakaway cable, hardware, etc. Any items that were damaged or lost during salvaging shall be replaced at the Contractors expense.

S-71.2 Measurement will be made by the lineal feet, as specified in the Plan. Payment will be made under Item 2554.603 (Install 3-Cable Guardrail) at the Contract bid price per lineal foot, which shall include but not be limited to all items as specified above or called out in the plan.

S-72 (2571) PLANT INSTALLATION

SP2005-239

MnDOT 2571 is hereby deleted from the MnDOT Standard Specifications and replaced with the attached Specification "2571 -- PLANT INSTALLATION AND ESTABLISHMENT" Revised 02/01/2012.

S-73 (2573) STORM WATER MANAGEMENT

SP2005-242

The provisions of MnDOT 2573 are supplemented and/or modified with the following:

S-73.1 The second paragraph of MnDOT 2573.3A1 Erosion Control Supervisor, is revised to read as follows:

The Erosion Control Supervisor shall be a responsible employee of the prime Contractor and/or duly authorized by the prime Contractor to represent the prime Contractor on all matters pertaining to the NPDES construction stormwater permit compliance. The Erosion Control Supervisor shall have authority over all Contractor operations which influence NPDES permit compliance including grading, excavation, bridge construction, culvert installation, utility work, clearing/grubbing, and any other operation that increases the erosion potential on the Project. In addition, the Erosion Control Supervisor shall implement the Contractor's quality control program and other provisions in accordance with 1717.2 and be available to be on the Project within 24 hours at all times from initial disturbance to final stabilization as well as perform the following duties:

S-73.2 MnDOT 2573.3 A2, Construction of Temporary Storm Water Basins, is revised to read as follows:

Temporary storm water basins shall be constructed concurrently with the start of soil disturbing activities whenever practicable. The basins must be made fully functional and have storm water runoff from the localized watershed directed to the basins. The exposed sideslopes of the basins must be mulched and/or seeded within the time periods as set forth in 1717, or as directed by the Engineer.

S-73.3 The second paragraph of MnDOT 2573.3 A5, Vehicle Tracking Onto Paved Surfaces, is revised to read as follows:

The Contractor is responsible for insuring paved streets are clean at the end of each working day or more often as necessary to provide safety to the traveling public. Tracked sediment on paved surfaces must be removed by the Contractor within 24 hours of discovery, in accordance with 1717.2. Payment for street sweeping to provide safe conditions for the traveling public, environmental reasons or regulatory requirements shall be as provided in accordance with 1514.

S-73.4 The first sentence of MnDOT 2573.3E2 is revised to read as follows:

The bioroll shall be installed and anchored with wood stakes. The stakes shall be at a minimum nominally 25 mm x 50 mm (1 inch x 2 inch) and a minimum of 400 mm (16 inches) long with a pointed end.

S-73.5 The first paragraph of MnDOT 2573.3J Filter Log Installation, is revised to read as follows:

J Filter Log Installation

Filter logs shall be placed in accordance with the Plan. Straw and wood fiber filter logs shall be staked in place with wood stakes. Wood stakes shall be at a minimum 25 x 51 mm (1 x 2 inch) nominal size by 400 mm (16 inches) long. The stakes shall be driven through the back half of the log at an angle of approximately 45 degrees with the top of the stake pointing upstream. When more than one log is needed for length, the ends shall be overlapped 150 mm (6 inches) with both ends staked. Staking shall be every 0.3 m (1 foot) along the log unless precluded by paved surface or rock.

S-73.6 MnDOT 2573.5 Basis of Payment, is revised to read as follows:

Payment for storm water management and sediment control items will be compensation in full for all labor, materials, equipment, and other incidentals necessary to complete the work as specified, including the costs of maintenance and removal as required by the Contract. The Contractor will receive compensation at the appropriate Contract prices, or in the absence of a Contract bid price, according to the following unit prices, or in the absence of a Contract price and unit price, as Extra Work. In the absence of a Contract item for Erosion Control Supervisor, this work shall be considered incidental.

S-73.7 MnDOT 2573.5 E, Unit Prices, is revised to read as follows:

The Department will pay the following unit prices for temporary sediment control items in the absence of a Contract bid price:

(1) Bale Barrier .....$13.45/m ($4.10 per linear foot)
(2) Silt Fence, Heavy Duty.....$10/m ($3.00 per linear foot)
(3) Flotation Silt Curtain, Type: Still Water, 1.2 m (4 foot) depth.....$54.10/m ($16.50 per linear foot)
(4) Sediment Trap Excavation..... $7.20/$m^3$ ($5.50 per cubic yard)
(5) Bituminous Lined Flume ..... $6.00/$m^2$ ($5.00 per square yard)
(6) Silt Fence, Type Machine Sliced .....$6.50/m ($2.00 per linear foot)
(7) Sediment Removal, Backhoe.....$175 per hour
(8) Filter Log, Type Straw Bioroll $1.00/m ($3.00/foot)
(9) Filter Log, Type Rock Log $16.50/m ($5.00/foot)
(10) Flocculant Sock .....$300 each

S-74 (2573) TEMPORARY ROCK CONSTRUCTION ENTRANCE

SP2005-245

This work shall consist of installing a temporary rock construction entrance and exit for trucks entering and exiting the Project. The temporary rock construction entrances shall be constructed as shown in the Plans, and as directed by the Engineer. The work shall be accomplished according to MnDOT 2573, these Special Provisions, or as directed by the Engineer.

Temporary Rock Construction Entrances will be measured by the each acceptably installed as specified. Payment will be made under Item 2573.602 (Temporary Rock Construction Entrance) at the Contract bid price per each, which shall be compensation in full for installing, cleaning, and the removal of the material once construction is completed, and all costs incidental thereto.

S-75 (2575) CONTROLLING EROSION AND ESTABLISHING VEGETATION

SP2005-245.2

The provisions of MnDOT 2575 are hereby modified and/or supplemented with the following:

S-75.1 MnDOT 2575.3D paragraph 2 and table 2575-2 are hereby deleted and replaced with the following:

The Contractor shall sow the seed uniformly at the rate of application specified in Table 3876-5.

S-75.2 MnDOT 2575.4D is hereby deleted and replaced with the following:

D Seed
When a bulk rate seed mixture is specified as shown in table 3876-5, the measurement will be made on that bulk mass. When a PLS rate seed mixture is specified as shown in table 3876-5, the measurement will be made on the PLS mass.

S-75.3 MnDOT 2575.5C is hereby deleted and replaced with the following:

C Seed

When a seed mixture is specified at a bulk rate as shown in table 3876-5, the payment will be made on that bulk mass. When a seed mixture is specified at a PLS rate as shown in table 3876-5, the payment will be made on the PLS mass.

Payment for seed not meeting germination and purity or PLS requirements of 3876 shall be subject to 1503. When components are missing from the specified mixture the affected seeded areas shall be reseeded with the missing components by the Contractor at no additional cost to the Department.

S-76 (2575) RAPID STABILIZATION SPECIFICATIONS

SP2005-245.3

This work shall consist of operations necessary to rapidly stabilize small critical areas, to prevent off site sedimentation and/or to comply with permit requirements. The work may be performed at any time during the Contract and will be conducted on small areas that may or may not be accessible with normal equipment. This work shall be done in accordance with the applicable MnDOT Standard Specifications, the details shown in the Plan, and the following:

S-76.1 BASIS OF PAYMENT

In the absence of a Contract bid price, the Department will pay the following unit prices for Rapidly Stabilizing Small Scattered Critical Areas directly abutting Waters of the State during rough grading and as required in the NPDES permit. These unit prices shall be construed to include mobilizations for this activity.

Rapid Stabilization	Pre-Approve Prices	
Method 1	$900/ha ($400/acre)	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately 0.4 to 0.8 ha [1 to 2 acres] of coverage.
Method 2	$2220/ha ($898/acre)	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately 0.4 to 0.8 ha [1 to 2 acres] of coverage.
Method 3	$149.50/$m^3$ ($566/M gallon)	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately 11.4 to 34 m^3 [3000 to 9000 gallons] of product slurry.
Method 4	$3.00/$m^2$ ($2.50/SY)	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately 150 to 650 m^2 [200 to 800 SY] of coverage.
Method 5	$48.60/metric ton ($45/ton)	Approved price reflects small quantities. Quantities installed per Project visit are assumed to require approximately 9 to 18 metric tons [10 to 20 tons] of riprap.

S-77 (2582) PERMANENT PAVEMENT MARKINGS

SP2005-248

The provisions of MnDOT 2582 are hereby modified and/or supplemented with the following:

S-77.1 The provisions of MnDOT 2582.2 are hereby deleted and replaced with the following:

A Preformed Plastic Markings for Permanent Traffic Lane Delineation and Legends 3354
B Epoxy Resin Pavement Markings (Free of Toxic Heavy Metals) 3590
C High Solids Water-Based Traffic Paint 3591
D Drop-On Glass Beads 3592

Qualified materials can be found on MnDOT's Qualified Products List on the Office of Traffic, Safety and Operations website. Other materials may be used on a provisional basis as detailed in

the QPL process and as approved by the Engineer. Type of material used will be as specified by Contract Documents.

S-77.2 MnDOT 2582.3A2 is hereby deleted.

S-77.3 MnDOT 2582.3G is hereby deleted and replaced with the following:

Contractors applying pavement markings for MnDOT under a contract are required to fill out the "Construction Striper Operations Daily Log" form which can be found on the Office of Traffic, Safety and Technology website and as approved by the Engineer.

S-77.4 The provisions of MnDOT 2582.5 are hereby deleted and replaced with the following:

2582.5 BASIS OF PAYMENT
Payment for pavement markings installed at Contract prices per unit of material shall be compensation in full for all costs incurred in materials, traffic control, installation, surface preparation, use of primers, in accordance to Contract documents or as approved by the Engineer.

ITEM NO.	ITEM	UNIT
2582.501	Pavement Message (1) (2)	Each
2582.502	__ mm (__inch) width (3) (4) (2)	meter (linear foot)
2582.503	Crosswalk Marking - (2)	square meter (square foot)

(1) Specify Message
(2) Specify Material
(3) Specified Type of Line (Solid, Broken or Dotted)
(4) Specify Color

S-78 (2582) PERMANENT PAVEMENT MARKINGS (POLY PREFORMED GROUND IN)

SP2005-248.2

The provisions of MnDOT 2582 are hereby modified and/or supplemented with the following:

S-78.1 The language below applies to permanent pavement markings for this Project that are to be recessed pavement markings, utilizing Poly Pref (GR IN).

S-78.2 The pavement marking material utilized for this Project must be listed within Tape System-Permanent category on the MnDOT Approved/Qualified Products Lists.

S-78.3 The provisions of MnDOT 2582.2 are hereby deleted and replaced with the following:

A Preformed Plastic Markings for Permanent Traffic Lane Delineation and legends 3354

Qualified materials can be found on MnDOT's Qualified Products List (QPL) on the Office of Traffic, Safety and Technology website. The Pavement Marking Materials QPL can be found at http://www.dot.state.mn.us/products/pavementmarkings/pmmaterials.html. Other materials may be used on a provisional basis as detailed in the QPL process and as approved by the Engineer. Type of material used will be as specified by Contract Documents.

S-78.4 The provisions of MnDOT 2582.3A2 are hereby deleted and replaced with the following:

Training of a striping Contractor – To assure the proper installation of pavement markings, the Contractor's crew shall obtain manufacturer certification. Certification is typically achieved by attending an application training seminar. The training shall address surface preparation and all application requirements and techniques necessary for successful marking tape applications. Upon completion of the seminar for these personnel,

the manufacturer of the marking tape shall provide written certification of approval to each person approved. On-site Contractor personnel shall present a valid training certification card upon request of the Engineer or other state Project personnel.

S-78.5 GROOVING BITUMINOUS *and/or* CONCRETE PAVEMENT SURFACES FOR POLYMER PREFORMED TAPE PAVEMENT MARKINGS

The polymer preformed tape pavement markings are to be grooved into the pavement surfaces. GRINDER-TYPE CUTTING HEADS CANNOT BE USED. The goal of the grooving process is to protect the pavement marking from snowplow damage and ultimately extend the service life of the pavement markings. Grooving operations are incidental to permanent pavement marking operations.

S-78.6 The following is hereby added to MnDOT 2582.3B, Application:

The Contractor has the option to dry or wet groove the pavement while the roadway is open or closed to traffic. The grove must be cleaned completely prior to pavement marking application, using an air compressor with at least 185 CFM air flow and 120 PSI air pressure. The compressor must be equipped with a moisture and oil trap, and cannot have more than 50 feet of 3/4 inch ID hose between the compressor and the air nozzle. The air nozzle must have an inside diameter of 1/2 inch or greater.

(A) Grooving Equipment

The grooving shall be performed by a self-propelled machine equipped with gang stacked diamond cutting blades mounted on a floating head with controls capable of providing uniform depth and alignment.

The cutting heads shall consist of stacked 3 mm to 9 mm [1/8 inch to 3/8 inch] wide diamond tipped cutting blades. The spacers between each blade must be such that the raise in the bottom of the finished groove between the blades is less than 25% of the groove depth. The resulting bottom of the groove shall have a fine corduroy finish. If a coarse tooth pattern is present, the Contractor shall increase the number of blades and/or decrease the thickness of the spacers on the cutting head.

The equipment shall be capable of grooving the total width of the groove in one pass or be capable of grooving uniform depths with multiple passes. The maximum number of passes is detailed below. If multiple passes are used, the ridge between passes shall be mechanically removed prior to groove cleaning and pavement marking application.

The equipment shall be capable of grooving double lines simultaneously or parallel lines to a uniform depth with two passes.

The equipment shall be self-vacuuming and leave the cut groove ready for pavement marking installation. Dry cut grooving without a vacuum will only be allowed if markings run perpendicular to the roadway, such as Stop Bars. The pavement marking manufacturer shall approve the equipment and method used.

(B) Grooves

The grooving shall be preformed within the following tolerances. Failure to meet these tolerances will result in the suspension of work until the Contractor can demonstrate that these tolerances can be met to the satisfaction of the Engineer. The pavement marking system shall be applied so that it is centered within the groove.

GROOVE WIDTH AND MAXIMUM NUMBER OF PASSES		
MARKING WIDTH	GROOVE WIDTH	MAX NUMBER OF PASSES
100 mm [4 inches]	130 mm ± 3 mm [5" ± 1/8"]	1
150 mm [6 inches]	180 mm ± 3 mm [7" ± 1/8"]	1
200 mm [8 inches]	230 mm ± 3 mm [9" ± 1/8"]	1
300 mm [12 inches]	330 mm ± 3 mm [13" ± 1/8"]	2
600 mm [24 inches]	635 mm ± 3 mm [25" ± 1/8"]	3

The groove depth shall be 110 mil ± 10 mil.

Since pavements are irregular, the depth of groove across the width may vary. To compensate for this, the depth of the groove shall be measured from the bottom of the groove to a straight edge extended over the groove from the pavement surface opposite the pavement joint.

FULL DEPTH GROOVE LENGTHS	
Full Depth Groove Length (Broken Line)	3 m ± 75 mm [10 feet ± 3 inches]
Tapers At End of Each Line	150 mm ± 230 mm [6 inches to 9 inches]
Space Between Double lines	100 mm ± 6 mm [4 inches ± 1/4 inch]

The groove shall be placed 50 mm ± 25 mm [2 inches ± 1 inch] from the edge of joints or seams along edge or centerline, unless otherwise indicated in the Plan.

Grooving alignment deviations from the control guide or existing lines specified by the Engineer shall not exceed 50 mm [2 inches].

All pavement markings to be grooved in shall be placed in accordance with pavement marking or element manufacturer's instructions.

If the Poly Pref (GR IN) markings are to be installed in the same location where there are existing pavement markings, including interim or temporary, the removal of the existing pavement markings shall be incidental to and included within the Poly Pref (GR IN) pay item. The Contractor may cut the groove and remove the existing marking in a simultaneous operation.

S-78.7 MnDOT 2582.3G is hereby deleted and replaced with the following:

Contractors applying pavement markings for MnDOT under a contract are required to fill out the "Construction Striper Operations Daily Log" form which can be found on the Office of Traffic, Safety and Technology website and as approved by the Engineer.

S-78.8 The provisions of MnDOT 2582.5 are hereby deleted and replaced with the following:

2582.5 BASIS OF PAYMENT

Payment for pavement markings installed at Contract prices per unit of material shall be compensation in full for all costs incurred in materials, traffic control, installation, surface preparation, use of primers, in accordance to Contract documents or as approved by the Engineer.

ITEM NO.	ITEM	UNIT
2582.501	Pavement Message (1) Poly Preform (GR IN)	Each
2582.502	__ mm (__inch) width (2) (3) – Poly Preform (GR IN)	meter (linear foot)
2582.503	Crosswalk Marking – Poly Preform (GR IN)	square meter (square foot)

(1) Specify Message
(2) Specified Type of Line (Solid, Broken or Dotted)
(3) Specify Color

S-79 (3103) PORTLAND-POZZOLAN CEMENT

SP2005-249.2

MnDOT 3103 is hereby deleted and replaced with the following:

Portland-Pozzolan cement shall be from certified sources only. Portland-Pozzolan cement furnished under this Specification shall conform to AASHTO M 240, Type IS, Type I(SM), Type IP, Type I(PM), Type IP-A or any other portland-pozzolan cement as approved by the Concrete Engineer, except as modified by the following:

(1) The fly ash constituent of the interground cement shall not exceed 20 percent.
(2) The fly ash constituent of blended cement shall not exceed 15 percent.
(3) The ground granulated blast furnace slag constituent of the interground cement shall not exceed 35 percent.
(4) The ground granulated blast furnace slag constituent of blended cement shall not exceed 35 percent.

All delivery invoices shall include a standardized Cement Certification Statement which is as follows: (insert company name) certifies that the cement produced at (insert plant and location) conforms to AASHTO and MnDOT Specifications for Type (insert Type) cement. The change of source or color, or both, of cement on a Project will not be permitted without the written approval of the Concrete Engineer.

S-80 (3137) COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE

(2011 Version (Rev. 4/27/11))

SP2005-249.3

MnDOT 3137 shall be deleted and replaced with the following:

3137.1 SCOPE

Provide coarse aggregate for use in portland cement concrete.

3137.2 REQUIREMENTS

A General

Provide coarse aggregate consisting of clean, sound, durable particles, uniform in quality, and free from wood, bark, roots, and other deleterious material.

The Engineer, in conjunction with the Concrete Engineer, may consider the following as the basis for acceptance of coarse aggregate for portland cement concrete:

(1) Results of laboratory tests,
(2) Behavior under natural exposure conditions,
(3) Behavior of other portland cement concrete with aggregate from the same or similar geological formations or deposits, and
(4) Any other tests or criteria as deemed appropriate by the Engineer, in conjunction with the Concrete Engineer.

B Classification

Provide coarse aggregate meeting the requirements of one of the following classifications:

(1) Class A: Crushed quarry rock including quartzite, gneiss, and granite, or mine trap rock including basalt, diabase, gabbro, and other igneous rock types. Class A aggregate may contain no greater than 4.0 percent non-Class A aggregate. The Department will not allow the intentional blending or adding of non-Class A aggregate.

(2) Class B: All other crushed quarry or mine rock types including carbonates, rhyolite, and schist.

(3) Class C: Natural or partly crushed gravel obtained from a natural gravel deposit.

(4) Class D: Mixture of at least two classes of coarse aggregate. The Engineer, in conjunction with the Concrete Engineer, will determine the suitability of the Class D aggregate for the proposed use including proportioning.

(5) Class R: Aggregate obtained from recycling concrete. The Engineer, in conjunction with the Concrete Engineer, will determine the suitability of the Class R aggregate for the proposed use including proportioning.

C Washing

Wash Class B, Class C, Class D, and Class R coarse aggregate. Wash Class A aggregate as needed to comply with the requirements of Table 3137-1.

D Quality

Quality requirements are based on each individual aggregate fraction unless otherwise allowed by the Engineer, in conjunction with the Concrete Engineer with the exception of the following:

(1) When 100 percent of the fractions from a single source pass the 1 in [25 mm] sieve, quality requirements are based on the composite value of the combined aggregates.

(2) When less than 100 percent of the fractions from a single source pass the 1 inch [25 mm] sieve:

(a) Those fractions passing the 1 inch [25 mm] sieve are combined and based on the composite value;

(b) The fractions greater than or equal to 1 inch [25 mm] are based on each individual aggregate fraction.

D1 Coarse Aggregate for General Use

Provide coarse aggregate for general use concrete in accordance with Table 3137-1.

Table 3137-1
Coarse Aggregate for General Use

	Quality Test	Maximum Percent by Weight
(a)	Shale:	
	Fraction retained on the ½ in [12.5 mm] sieve	0.4
	Fraction retained on the No. 4 [4.75 mm] sieve, as a percentage of the total material	0.7
(b)	Soft iron oxide particles (paint rock and ochre)	0.3
(c)	Total spall materials*:	
	Fraction retained on the ½ in [12.5 mm] sieve	1.0
	Fraction retained on the No. 4 [4.75 mm] sieve, as a percentage of the total material	1.5
(d)	Soft particles ‖	2.5
(e)	Clay balls and lumps	0.3
(f)	Sum of (c) total spall materials, (d) soft particles, and (e) clay balls and lumps†	3.5
(g)	Slate	3.0
(h)	Flat or elongated pieces‡	15.0
(i)	Quantity of material passing No. 200 [75 µm] sieve:	
	Class A and Class B aggregates#	1.5
	Class C and Class D aggregates§	1.0
(j)	Los Angeles Rattler, loss on total sample	40.0
(k)	Soundness of magnesium sulfate**	15.0

* Includes the percentages retained by shale and soft iron oxide particles, plus other iron oxide particles, unsound cherts, pyrite, and other materials with similar characteristics.
‖ Exclusive of shale, soft iron oxide particles, and total spall materials.
† Sum of the total spall materials, soft particles, and clay balls and lumps. For total spall materials, use the percent in the total sample retained on the No. 4 [4.75 mm] sieve.
‡ Thickness less than 25 percent of the maximum width. Length greater than 3 times the maximum width.
# Each individual fraction at the point of placement consists of dust from the fracture and free of clay or shale.
§ For each individual fraction at the point of placement.
** Loss at 5 cycles for any fraction of the coarse aggregate. Do not blend materials from multiple sources to obtain a fraction meeting the sulfate soundness requirement.

D2 Coarse Aggregate for Bridge Superstructure

Provide coarse aggregate in accordance with 3137.2D1 except as modified by Table 3137-2 for use in the following:

(1) Bridge superstructure (deck, railing, posts, curbs, sidewalks, and median strips);
(2) Approach panels; and
(3) Precast concrete panel facings for Mechanically Stabilized Earth walls.

Table 3137-2 Coarse Aggregate for Bridge Superstructure		
Quality Test		Maximum Percent by Weight
(a)	Shale:	
	Fraction retained on the ½ in [12.5 mm] sieve	0.2
	Fraction retained on the No. 4 [4.75 mm] sieve as a percentage of the total material	0.3
(b)	Soft iron oxide particles (paint rock and ochre)	0.2
(c)	Total spall materials*:	
	Fraction retained on the No. 4 [4.75 mm] sieve as a percentage of the total material	0.5
(d)	Soft particles ‖	2.5
(e)	Clay balls and lumps	0.3
(f)	Sum of (c) total spall materials, (d) soft particles, and (e) clay balls and lumps, use the percent in the total sample retained on the No. 4 [4.75 mm] sieve	3.0
(g)	Absorption for Class B aggregate	1.10
(h)	Carbonate in Class C and Class D aggregates by weight	30.0
*	Includes the percentages retained by shale and soft iron oxide particles, plus other iron oxide particles, unsound cherts, pyrite, and other materials with similar characteristics.	
‖	Exclusive of shale, soft iron oxide particles, and total spall materials.	
†	Sum of the total spall materials, soft particles, and clay balls and lumps. For total spall materials, use the percent in the total sample retained on the No. 4 [4.75 mm] sieve.	

D3 Coarse Aggregate for Concrete Pavement

Provide coarse aggregate in accordance with 3137.2D1, except as modified by Table 3137-3, for use in the following:

(1) Concrete pavement, and
(2) Concrete pavement rehabilitation.

Table 3137-3 Coarse Aggregate for Concrete Pavement		
Quality Test		Maximum Percent by Weight
(a)	Absorption for Class B aggregate	1.75
(b)	Carbonate in Class C aggregate by weight	30.0

E Gradation

Provide coarse aggregate in accordance with Table 3137-4 including all sizes within the specified limits. The Department defines coarse aggregate as the uniform product of the producing plant, unless some sizes are removed to meet the gradation requirements. Do not use broken or noncontinuous gradations.

If the coarse aggregate has less than 100 percent passing the 1 in [25 mm] sieve, proportion the coarse aggregate using at least two fractions. Gradation requirements are based on the composite value of the combined coarse aggregates.

Table 3137-4
Coarse Aggregate Designation for Concrete,
percent by weight passing square opening sieves

Aggregate	2 in [50 mm]	1½ in [37.5 mm]	1¼ in [31.5 mm]	1 in [25.0 mm]	¾ in [19.0 mm]	⅝ in [16.0 mm]	½ in [12.5 mm]	⅜ in [9.5 mm]	No.4 [4.75 mm]
CA-00	—	—	—	100	95 – 100	—	—	—	0 – 10
CA-15	100	95 – 100	—	—	35 – 65	—	—	5 – 25	0 – 7
CA-25	100	95 – 100	—	—	50 – 80	—	—	20 – 40	0 – 7
CA-35	—	100	95 – 100	—	55 –85	—	—	20 – 45	0 – 7
CA-45	—	—	100	95 – 100	65 – 95	—	—	25 – 55	0 – 7
CA-50	—	—	—	100	85 – 100	—	—	30 – 60	0 – 12
CA-60	—	—	—	—	100	85 – 100	—	40 – 70	0 – 12
CA-70	—	—	—	—	—	100	85 – 100	50 – 100	0 – 25
CA-80*	—	—	—	—	—	—	—	100	55 – 95

* Do not allow greater than 5 percent to pass the No. 50 [300 µm] sieve.

If producing Class R aggregate, remove reinforcing steel from the concrete and any concrete material passing the No 4 [4.75 mm] sieve.

3137.3 SAMPLING AND TESTING

Sample and test coarse aggregate fractions separately in accordance with Table 3137-5.

Table 3137-5
Preliminary Coarse Aggregate Testing

Aggregate	Notification and Testing Requirement
New source	Notify the Engineer at least 1 month before use. Perform new source concrete aggregate testing in accordance with the procedure on the Department's website.
Previously tested aggregate	Notify the Engineer at least 2 weeks before use. Perform additional testing as directed by the Engineer, in conjunction with the Concrete Engineer.

Sample and test coarse aggregate in accordance with Table 3137-6.

Table 3137-6
Coarse Aggregate Test Methods

Test	Testing Method
Sampling	MnDOT Concrete Manual
Sieve analysis	MnDOT Concrete Manual
Shale test	MnDOT Laboratory Manual 1207
Quantity of material passing the No. 200 [75 µm] sieve	MnDOT Concrete Manual
Specific gravity and absorption	MnDOT Laboratory Manual 1204
Density	AASHTO T 19 or MnDOT Laboratory Manual 1211
Los Angeles Rattler loss	AASHTO T 96
Void content	AASHTO T 19* or MnDOT Laboratory Manual 1211
Deleterious materials	MnDOT Laboratory Manual 1209
Soundness; magnesium sulfate	MnDOT Laboratory Manual 1219
Soft particles	MnDOT Laboratory Manual 1218
Flat or elongated pieces	ASTM D 4791
Clay balls or lumps	MnDOT Concrete Manual

* Base the void content on an oven-dry and compacted-by-rodding condition of the aggregate and a value of 62.4 lb per cu. ft [1,000 kg per cu. m] for water.

S-81 (3138) AGGREGATE FOR SURFACE AND BASE COURSES

SP2005-250

The provisions of MnDOT 3138 are hereby modified as follows:

S-81.1 The second paragraph of MnDOT 3138.2B Gradation Tables 3138-1 and 2, is revised to read as follows:

If Class 7 is substituted for Classes 1, 3, 4, 5, or 6, it shall meet the gradation requirements of the substituted class (Table 3138-1); except that, for Class 5 and 6, up to 5 percent by mass (weight) of the total composite mixture may exceed 25.0 mm (1 inch) sieve but 100 percent must pass the 37.5 mm (1.5 inch) sieve. Surfacing aggregate mixtures containing salvaged materials shall meet the gradation requirements of the materials specified in the Plan. All gradations will be run on the composite mixture before extraction of the bituminous material.

S-81.2 TABLE 3138-1 in MnDOT 3138.2B Gradation Tables 3138-1 and 2, is hereby deleted and replaced with the following:

TABLE 3138-1
BASE AND SURFACING AGGREGATE
Total Percent Passing

Sieve Size	Class 1 (A)	Class 2	Class 3 (A)	Class 4 (A)	Class 5 (A) (B)	Class 6 (A) (B)
75 mm (3 inches)	--	--	--	--	--	--
50 mm (2 inches)	--	--	100	100	--	--
37.5 mm (1½ inches)	--	--	--	--	--	--
25.0 mm (1 inch)	--	--	--	--	100	100
19.0 mm (3/4 inch)	100	100	--	--	90-100	90-100
9.5 mm (3/8 inch)	65-95	65-90	--	--	50-90	50-85
4.75 mm (No. 4)	40-85	35-70	35-100	35-100	35-80	35-70
2.00 mm (No. 10)	25-70	25-45	20-100	20-100	20-65	20-55
425 µm (No. 40)	10-45	12-30	5-50	5-35	10-35	10-30
75 µm (No. 200)	8.0-15.0	5.0-13.0	5.0-10.0	4.0-10.0	3.0-10.0	3.0-7.0

(A) When salvaged materials are substituted for another class of aggregate, it shall meet the gradation requirements of the class being replaced except as amended in 3138.2 B.

(B) The gradation requirements for aggregates containing 60% or more crushed quarry rock may be amended with the concurrence of the Project Engineer and the Grading and Base Engineer.

S-81.3 The first paragraph of MnDOT 3138.3 Sampling and Testing, is hereby deleted and replaced with the following:

Samples for testing to determine compliance with the aggregate gradation specifications for base and shoulder surfacing shall be obtained from the roadway at a time when the material is ready for compaction. However, Class 1, 2, and 7 shoulder surfacing aggregates may be sampled from a stockpile, tested, and accepted before roadway placement, provided that:

(a) No more than 25 percent of the stockpile samples fail to meet gradation requirements.
(b) The average of all stockpile tests meet requirements.
(c) The Contractor mixes the material during placement to the satisfaction of the Engineer.

S-81.4 The fifth paragraph of MnDOT 3138.3 Sampling and Testing, is revised to read as follows:

The stockpile shall be sampled at the rate of one field gradation test per 1,000 metric tons (tons) of aggregate used on the Project.

S-82 (3139) GRADED AGGREGATE FOR BITUMINOUS MIXTURES – MODIFIED

(2011 Version (Rev. 3/17/11))

SP2005-250.1

MnDOT 3139 is hereby deleted and replaced with the following:

S-82.1 See Special Provision 2360 for additional bituminous Mixture Aggregate Requirements.

3139 Graded Aggregate for Bituminous Mixtures

3139.1 Scope

Provide graded aggregate for use in bituminous mixtures.

3139.2 PLANT MIXED ASPHALT Requirements

A Composition

Provide graded aggregate composed of any combination of the following sound durable particles as described in 3139.2B.

Do not use graded aggregate containing objectionable materials including:

(1) Metal,
(2) Glass,
(3) Wood,
(4) Plastic,
(5) Brick, or
(6) Rubber.

Provide coarse aggregate free of coatings of clay and silt.

Do not add soil materials such as clay, loam, or silt to compensate for a lack of fines in the aggregate.

Do not blend overburden soil into the aggregate.

Feed each material or size of material from an individual storage unit at a uniform rate.

Do not place blended materials from different sources, or for different classes, types, or sizes together in one stockpile unless approved by the Engineer as a Class E aggregate.

B Classification

B.1 Class A

Provide crushed igneous bedrock consisting of basalt, gabbro, granite, gneiss, rhyolite, diorite, and andosite. Rock from the Sioux Quartzite Formation may contain no greater than 4.0 percent non-Class A aggregate. Do not blend or add non-Class A aggregate to Class A aggregate.

B.2 Class B

Provide crushed rock from other bedrock sources such as carbonate and metamorphic rocks (Schist).

B.3 Class C

Provide natural or partly crushed natural gravel obtained from a natural gravel deposit.

B.4 Class D

Provide 100 percent crushed natural gravel produced from material retained on a square mesh sieve with an opening at least twice as large as Table 3139-2 allows for the maximum size of the aggregate in the composite asphalt mixture. Ensure the amount of carryover, material finer than the selected sieve, no greater than 10 percent of the Class D aggregate by weight.

B.5 Class E

Provide a mixture consisting of at least two of the following classes of approved aggregate:

(1) Class A,
(2) Class B, and
(3) Class D.

B.6 Steel Slag

Steel slag cannot exceed 25% of the total mixture aggregate and be free from metallic and other mill waste. The Engineer will accept stockpiles if the total expansion is no greater than 0.5 percent as determined by ASTM D 4792

B.7 Taconite Tailings

Obtain taconite tailings from ore mined westerly of a north-south line located east of Biwabik, Minnesota (R15W-R16W) or from ore mined in southwestern Wisconsin.

B.8 Recycled Asphalt Shingles (RAS)

Provide recycled asphalt shingles manufactured from waste scrap asphalt shingles (MWSS) or from tear-off scrap asphalt shingles (TOSS). Consider the percentage of RAS used as part of the maximum allowable Recycled Asphalt Pavement (RAP) percentage. See Table 3139-3.

B.8.A RAS Gradation.....MnDOT Laboratory Procedure 1801

Provide RAS in accordance with the following gradation requirements:

Table 3139-1
RAS Gradation

Sieve size	Percent passing
½ in [12.5 mm]	100
No. 4 [4.75 mm]	90

B.8.B Binder Content

Determine the binder content using chemical extraction meeting the requirements of MnDOT Lab Procedure 1851 or 1852.

B.8.C Bulk Specific Gravity

The Contractor may use an aggregate bulk specific gravity (Gsb) of 2.650 in lieu of determining the shingle aggregate Gsb in accordance with MnDOT Lab Procedure 1205.

B.8.D Waste Materials

Do not allow extraneous materials including metals, glass, rubber, nails, soil, brick, tars, paper, wood, and plastics greater than 0.5 percent by weight of the graded aggregate as determined by material retained on the No. 4 [4.75 mm] sieve as specified in MnDOT Laboratory Procedure 1801.

B.8.E Stockpile

Do not blend an RAS stockpile with other salvage material. Do not blend MWSS and TOSS. The Contractor may blend virgin sand material with RAS to minimize agglomeration if the Contractor accounts for the blended sand in the final mixture gradation.

B.8.F Certification

Ensure the processor provides RAS certification on the following Department form "Scrap Asphalt Shingles from Manufacture Waste" or "Tear-Off Scrap Asphalt Shingles" at www.dot.state.mn.us/materials/bituminous.html

B.9 Crushed Concrete and Salvaged Aggregate

The Contractor may incorporate no greater than 50 percent of crushed concrete and salvaged aggregate in non-wear mixtures. Do not use crushed concrete in wearing courses.

B.10 Ash

Sewage sludge ash and waste incinerator ash are allowed as an aggregate source at a maximum of 5% of the total weight of the mixture. Only use sewage sludge ash meeting the requirements of the Tier II hazard evaluation criteria as approved by the Engineer with concurrence with MnDOT's Environmental Assessment Engineer in the mixture. Only use waste incinerator ash sources approved by the Engineer with concurrence with MnDOT's Environmental Assessment Engineer.

B.11 Recycled Asphalt Pavement (RAP)

B.11.A Aggregate Angularity

Provide combined RAP and virgin aggregates that meet the composite coarse and fine aggregate angularity for the mixture being produced.

B.11.B Objectionable Material

Do not use RAP containing objectionable materials including metal, glass, wood, plastic, brick, or rubber.

B.11.C Asphalt Binder Content

Determine the asphalt binder content using the MnDOT Lab Manual Method 1851 and 1852.

B.11.D Bulk Specific Gravity

Determine the bulk specific gravity in accordance with MnDOT Laboratory Procedure 1205 or 1815.

C Quality

C.1 Los Angeles Rattler Test.....MnDOT Laboratory Procedure 1210

Ensure a coarse aggregate loss no greater than 40 percent.

C.2 Soundness (Magnesium Sulfate).....MnDOT Laboratory Procedure 1219

Maximum loss after 5 cycles on the coarse aggregate fraction (material retained on No. 4 [4.75 mm] sieve for any individual source within the mix) as follows:

(1) Percent passing the ¾ in [19 mm] sieve to percent retained on the ½ in [12.5 mm] sieve, ≤ 14%,
(2) Percent passing the ½ in [12.5 mm] sieve to percent retained on the ⅜ in [9.5 mm]sieve, ≤18%,
(3) Percent passing the ⅜ in [9.5 mm] sieve to percent retained on the No. 4 [4.75 mm] sieve, ≤ 23%,
(4) For the composite if all three size fractions are tested, the composite loss ≤ 18%, and acceptance will be granted if:
  (4.1) If the Contractor meets the composite requirement, but fails to meet at least one of the individual components, the Engineer may accept the source if each individual component is no greater than 110 percent of the requirement for that component.
  (4.2) If the Contractor meets each individual component requirement, but fails to meet the composite, the Engineer may accept the source if the composite is no greater than 110 percent of the requirement for the composite.

Coarse aggregate that exceeds the requirements in this section for material passing the No. 4 [4.75 mm] sieve cannot be used.

C.3 Spall Materials and Lumps .....MnDOT Laboratory Procedure 1219

Stop asphalt production if the percent of spall or lumps measured in the stockpile or cold feed exceeds the values listed in Table 3139-3. Determine lump compliance by dry batching.

C.4 Insoluble Residue Test.....MnDOT Laboratory Procedure 1221

If using Class B carbonate materials ensure the portion of the insoluble residue passing the No. 200 [75 µm] sieve is no greater than 10 percent.

D Gradation

Ensure the aggregate gradation broad bands meet the following requirements in accordance with AASHTO T-11 (passing the No. 200 [75 µm] wash) and AASHTO T-27.

Table 3139-2
Aggregate Gradation Broad Bands (percent passing of total washed gradation)

Sieve size	A	B	C	D
1 in [25.0 mm]	—	—	100	—
¾ in [19.0 mm]	—	100*	85 – 100	—
½ in [12.5 mm]	100*	85 – 100	45 – 90	—
⅜ in [9.5 mm]	85 – 100	35 – 90	—	100
No. 4 [4.75 mm]	25 – 90	30 – 80	30 – 75	65 – 95
No. 8 [2.36 mm]	20 – 70	25 – 65	25 – 60	45 – 80
No. 200 [0.075 mm]	2.0 – 7.0	2.0 – 7.0	2.0 – 7.0	3.0 – 8.0

* The Contractor may reduce the gradation broadband for the maximum aggregate size to 97 percent passing for mixtures containing RAP, if the oversize material originates from the RAP source. Ensure the virgin material meets the requirement of 100 percent passing the maximum aggregate sieve size.

Table 3139-3
Mixture Aggregate Requirements

Aggregate Blend Property	Traffic Level 2	Traffic Level 3	Traffic Level 4	Traffic Level 5
20 year Design ESAL's	<1 million	1 - 3 million	3 - 10 million	10 – 30 million
Min. Coarse Aggregate Angularity (ASTM D5821) (one face / two face), %- Wear (one face / two face), %- Non-Wear	 30/- 30/-	 55 / - 55 / -	 85 / 80 60/ -	 95 / 90 80 / 75
Min. Fine Aggregate Angularity (FAA) (AASHTO T304, Method A) %- Wear %-Non-Wear	40 40	42 40	44 40	45 40
Flat and Elongated Particles, max % by weight, (ASTM D 4791)	-	10 (5:1 ratio)	10 (5:1 ratio)	10 (5:1 ratio)
Min. Sand Equivalent (AASHTO T 176)	-	-	45	45
Max. Total Spall in fraction retained on the #4 [4.75mm] sieve – Wear Non-Wear	5.0 5.0	2.5 5.0	1.0 2.5	1.0 2.5
Maximum Spall Content in Total Sample – Wear Non-Wear	5.0 5.0	5.0 5.0	1.0 2.5	1.0 2.5
Maximum Percent Lumps in fraction retained on the #4 [4.75mm] sieve	0.5	0.5	0.5	0.5
Class B Carbonate Restrictions				
Maximum% -#4 [-4.75mm] Final Lift/All other Lifts	100/100	100/100	80/80	50/80
Maximum% +#4 [+4.75mm] Final Lift/All other Lifts	100/100	100/100	50/100	0/100
Max. allowable scrap shingles–MWSS[(1)] Wear/Non Wear	5/5	5/5	5/5	5/5
Max. allowable scrap shingles –TOSS[(1)] Final Lift/All other Lifts	5/5	5/5	0/5	0/0

(1) MWSS is manufactured waste scrap shingle and TOSS is tear-off scrap shingle.

3139.3 Permeable Asphalt Stabilized Stress Relief Course (PASSRC) and Permeable Asphalt Stabilized Base (PASB) Requirements

A Restrictions

Do not use recycled materials including glass, concrete, bituminous, shingles, ash, and steel slag.

B Gradation

The Gradation limits are also considered the Job Mix Formula (JMF) limits.

B.1 PASB

Table 3139-4
PASB Aggregate Gradation

Sieve Size	Percent Passing

1 ½ inch [37.5 mm]	100
1 inch [25.0 mm]	95 - 100
¾ inch [19.0 mm]	85 – 95
3/8 inch [9.5 mm]	30 – 60
No. 4 [4.75 mm]	10 – 30
No. 8 [2.36 mm]	0 – 10
No. 30 [600 µm]	0 – 5
No. 200 [75 µm]	0 - 3

B.2 PASSRC

Table 3139-5 PASSRC Aggregate Gradation	
Sieve Size	Percent Passing
5/8 inch [16.0 mm]	100
1/2 inch [12.5 mm]	85 – 100
3/8 inch [9.5 mm]	50 – 100
No. 4 [4.75 mm]	0 – 25
No. 8 [2.36 mm]	0 – 5

C Quality

Requirements will meet all of 3139.2.C.

D Mixture Quality Requirements

Table 3139-6 Mixture Aggregate Requirements for PASSRC & PASB	
Aggregate Blend Property	
Coarse Aggregate Angularity (ASTM D5821) (one face/two face) % PASSRC (1) PASB (1)	 95/- -/65
Fine Aggregate Angularity (FAA) (AASHTO T304, Method A) %	NA
Flat and Elongated Particles, max(2) % by weight, (ASTM D 4791)	NA
Clay Content (2) (AASHTO T 176)	NA
Total Spall in fraction retained on the 4.75mm [#4] sieve	3.0
Maximum Spall Content in Total Sample	5.0
Maximum Percent Lumps in fraction retained on the 4.75mm [#4] sieve	0.5

(1) Carbonate Restrictions: If Class B (as defined in 3139.2.B.2), crushed carbonate quarry rock (limestone or dolostone), is used in the mixture, or if carbonate particles in the material retained on the 4.75 mm [No. 4] sieve exceeds 55 percent, by weight, the minus 0.075 mm [# 200] sieve size portion of the insoluble residue shall not exceed 10 percent.

3139.4 Ultra Thin Bonded Wearing Course (UTBWC) Requirements.

A. Restrictions

Do not use recycled materials including glass, concrete, bituminous, shingles, ash, and steel slag.

B. Coarse Aggregate

Provide a Class A aggregate, as defined in 3139.2.B.1, in accordance with the following requirements:

Table 3139-7
UTBWC Coarse Aggregate Requirements

Tests	MnDOT Laboratory Manual Method	Limit, %
Flat and elongated ratio at 3:1	1208	≤ 25
Los Angeles Rattler Test (LAR)	1210	≤ 40
Bulk Specific Gravity	1204	

C. Fine Aggregate

Provide fine aggregate, passing the No. 4 [4.75 mm] sieve in accordance with the following requirements:

Table 3139-8
Fine Aggregate Requirements

Tests	Method	Limit, %
Sand equivalent*	AASHTO T 176	≥ 45
Uncompacted void content	MnDOT Laboratory Manual 1206	≥ 40
Bulk Specific Gravity	MnDOT Laboratory Manual 1205	

3139.5 SAMPLING AND TESTING

Perform sampling, sieve analysis, lumps, crushing, and shale testing meeting the requirements of the MnDOT Laboratory Manual.

S-83 (3236) REINFORCED CONCRETE PIPE

SP2005-251

The provisions of MnDOT 3236 are modified and/or supplemented with the following:

S-83.1 Manufacturers of reinforced concrete pipe may produce an alternate "offset joint" on the spigot end of the pipe. This type of offset joint is to be used with the profile or prelubricated pipe seal systems. See MnDOT Standard Plate 3006.

S-83.2 The first paragraph of MnDOT 3236.2A3 is hereby deleted and replaced with the following:

Cement substitutions as addressed in 2461.3D are hereby modified as follows to allow:

(a) 30 percent Class F or Class C fly ash by weight
(b) 35 percent ground granulated blast furnace slag by weight
(c) 35 percent substitution with a combination of ground granulated blast furnace slag and Type F or Type C fly ash by weight

All other provisions of 2461.3D shall apply. The use of admixtures shall conform to 2461.3E.

S-84 (3301) REINFORCEMENT BARS

SP2005-252.2

The third to the last paragraph of MnDOT 3301.2 is hereby deleted and replaced with the following:

When epoxy coated reinforcement bars are specified, coating shall be in conformance with AASHTO M 284M/M 284-06. Application of epoxy coating shall be made in a fusion bonded epoxy coating plant that has been granted "Certification" by the Concrete Reinforcing Steel Institute, or an organization approved by the Materials Engineer.

S-85 (3302) DOWEL BARS

SP2005-253

MnDOT 3302 is hereby deleted and replaced with the following:

Dowel bars shall be fabricated from Grade 40 or 60 steel in accordance with AASHTO M31 and be epoxy coated in conformance with AASHTO M254. The ends of the dowel bars may be epoxy coated at the discretion of the fabricator. Application of epoxy coating shall be made in a fusion bonded epoxy coating plant that has been granted "Certification" by the Concrete Reinforcing Steel Institute, or an organization approved by the Materials Engineer.

The plant's quality control office shall maintain documentation containing the data required by certification. This documentation shall contain test data and measurements taken at times and locations approved by the Engineer, ensuring that monitoring, by personnel not directly involved in production, is sufficient for compliance with approved procedures.

All dowel bars shall be stored and protected in accordance with 2472.

Shearing will be permitted provided the coating is not damaged and subject to permissible deformation. Any deformation larger than true shape shall not exceed 1 mm (0.04 inch) increase in diameter or thickness and shall not extend more than 10 mm (0.40 inch) from the dowel end.

S-86 (3310) HIGH STRENGTH LOW ALLOY COLUMBIUM-VANADIUM STEEL

SP2005-253.1

The second paragraph of MnDOT 3310.2 is hereby deleted and replaced with the following:

Sheet and strip supplied to this Specification shall conform to ASTM A 1011/A 1011M, Grade 340 (50), Class 1; ASTM A 1018/A 1018M, Grade 340 (50), Class 1; and 3308.

S-87 (3401) FLANGED CHANNEL SIGN POSTS

SP2005-255

The provisions of MnDOT 3401 are hereby modified and/or supplemented with the following:

S-87.1 The last sentence of MnDOT 3401.2A Material, is hereby revised to read as follows:

The steel shall conform to the mechanical requirements of ASTM A 499, Grade 420 (60) and to the chemical requirements of ASTM A 1 for rails having nominal mass of 45 kg per m [91 pounds per yard] of length or heavier.

S-87.2 MnDOT 3401.2C Mass, is hereby deleted and the following substituted therefore:

C Mass (Weight)
The nominal mass (weight) of the posts shall be as specified in the Plans, 3.0, 3.7, 4.1, 4.5, or 6.0 kg/m (2.0, 2.5, 2.75, 3.0, or 4.0 pounds per foot) of length, before punching and exclusive of

galvanizing, anchor plates, and other attachments. A variation up to 5 percent under the specified mass (weight) will be permitted.

S-87.3 MnDOT 3401.2D, Shape and Dimensions, is hereby deleted and the following substituted therefore:

D Shape and Dimensions
The posts shall be of channel section design with flanges against which the sign will be placed. The front face of the flanges shall be flat and in the same plane so as to provide smooth, uniform bearing for the sign. The back of the flanges and the posts shall be flat and parallel to the front. The cross section of the posts shall be symmetrical about the central axis perpendicular to the front and back.

The posts shall be straight, free from excessive bow, twist, and other injurious or unsightly defects.

S-87.4 Table 3401-1 is hereby deleted and the following substituted therefore:

TABLE 3401-1
NOMINAL DIMENSIONS

Mass per Unit of Length	3.0 kg (2.0 pound)	3.7 kg (2.5 pound)	4.1 kg (2.75 pound)	4.5 kg (3.0 pound)	6.0 kg (4.0 pound)
Wide overall across front	76 mm (3 inches)	76 mm (3 inches)	76 mm (3 inches)	83 mm (3¼ inches)	89 mm (3½ inches)
back surface	25 mm (1 inch)	25 mm (1 inch)	25 mm (1 inch)	32 mm (1¼ inches)	32 mm (1¼ inches)
flanges (bearing surface)	13 mm (½ inch)	13 mm (½ inch)	13 mm (½ inch)	16 mm (⅝ inch)	19 mm (¾ inch)
Depth overall, front to back	35 mm (1⅜ inches)	35 mm (1⅜ inches)	38 mm (1½ inches)	38 mm (1½ inches)	43 mm (1.7 inch)
Thickness of Metal, Flanges & Back	3 mm (1/8 inch)	3 mm (1/8 inch)	5 mm (3/16 inch)	4 mm (0.16 inch)	5 mm (0.20 inch)
Sides	3 mm (1/10 inch)	3 mm (1/8 inch)	3 mm (1/8 inch)	4 mm (0.15 inch)	4 mm (0.15 inch)

NOTE: Dimension requirements are for flat flange sections.

S-88 (3590) EPOXY RESIN PAVEMENT MARKINGS (FREE OF TOXIC HEAVY METALS)

SP2005-257

The provisions of MnDOT 3590.3 are hereby deleted and replaced with the following:

3590.3 SPECIFIC REQUIREMENTS

A Epoxy Resin Material

The material shall be composed of epoxy resins and pigments only. No solvents are to be given off to the environment upon application to a pavement surface.

The composition shall be within the tolerance permitted for the product tested and approved by MnDOT. Type II material shall be completely free of TMPTA (Tri-Methyol Propane Tri-Acrylate) and other multi-functional monomers.

All materials shall be free of lead, cadmium, mercury, hexavalent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency.

Color:

The color of the white epoxy shall be a pure flat white, free of tints. The color of the yellow epoxy shall closely match Color Number 33538 of Federal Standard 595 and shall conform to the following CIE Chromaticity limits using illuminant "C":

x	0.470	0.485	0.520	0.480
y	0.440	0.460	0.450	0.420

Daylight Directional Reflectance (Y), white, minimum 83
Daylight Directional Reflectance (Y), yellow, minimum 50

Testing will be according to:

Daylight Directional Reflectance.....ASTM D 2805
Color.....ASTM D 2805

Adhesion Capabilities:

When the adhesion of the material to portland cement concrete (the concrete shall have a minimum of 2 070 kPa [300 psi.] tensile strength) is tested according to American Concrete Institute Committee 403 testing procedure, the failure of the system must take place in the concrete. The concrete shall be 32°C [0°F] when the material is applied, after which the material shall be allowed to cure for 72 hours at 23 ± 2°C [73 ± 36° F].

Abrasion Resistance:

When the abrasion resistance of the material is tested according to ASTM C 501 with a CS-17 wheel under a load of 1000 grams for 1000 cycles, the wear index shall be no greater than 82. (The wear index is the weight in milligrams that is abraded from the sample under the test conditions).

Hardness:

The Type D durometer hardness of the material shall be not less than 75 nor more than 90 when tested according to ASTM D2240 after the material has cured for 72 hours at 23 ± 2°C [73 ± 36° F].

Tensile Strength:

The tensile strength of the material, when tested according to ASTM D 638, shall not be less than 41 370 kPa [6,000 psi.] after 72 hours cure at 23 ± 2°C [73 ± 36° F].

Compressive Strength:

The compressive strength of the material, when tested according to ASTM D 695, shall not be less than 82,700 kPa [12,000 psi.] after 72 hours cure at 23±2°C [73 ± 36° F].

Thickness:

The epoxy pavement marking wet film thicknesses shall be a minimum of 380 µm [15 mil] on all pavement surfaces. For the Spec 2360 SUPERPAVE wearing courses the epoxy pavement marking wet film thicknesses shall be increase from a minimum of 380 µm [15 mil] to a minimum thickness of 508 µm [20 mil] wet film.

B Glass Beads

Glass beads shall meet the requirements of AASHTO M247, Type I, and:

a. Coatings -- the beads shall be treated according to the manufacturers recommendations and meet the requirements of Section 4.4.2 of M247, and
b. Roundness-- the beads shall have a roundness of at least 80%.

For 380 μm [15 mil] applications, glass beads shall be applied at a rate of at least 3.0 kg/L [25 pounds per gallon]. A greater bead application rate may be necessary for meeting the performance criteria (minimum levels of retroreflectivity). This will require contractors to consult with all the material manufacturers.

Time to No-Track:

Type I material shall be in "no-tracking" condition in 15 minutes or less and within 45 minutes for Type II material. The "no-tracking" condition shall be determined on an application of specified thickness to the pavement and covered with glass beads at the rate of at least 3.0 kg/L [25 pounds per gallon]. The lines for this test shall be applied with striping equipment operated so as to have the material at manufacturer's recommended application temperature. This maximum "no-tracking" time shall not be exceeded when the pavement temperature varies from 10 to 49° C [50 to 120° F] and under all humidity conditions, providing the pavement is dry. The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck at a speed of 40 to 55 km/hr [25 to 35 mph] in a simulated passing maneuver. A line showing no visual deposition of the material to the pavement surface when viewed from a distance of 15 m [50 feet] shall be considered as showing "no-tracking" and conforming to this requirement for time to "no-track."

S-89 (3592) DROP-ON GLASS BEADS

SP2005-259

The provisions of MnDOT 3592.3 are hereby deleted and replaced with the following:

3592.3 SPECIFIC REQUIREMENTS

Glass beads shall meet the requirements of AASHTO M247, Type I, "standard gradation" except the beads will have a minimum of 80 percent true spheres. The dual treated beads will meet the moisture resistant requirements of AASHTO M 247 Section 4.4.2 and pass the adherence treatment Dansyl Chloride Test. The moisture resistant silicone treated beads will meet AASHTO M 247 Section 4.2.2.

S-90 (3721) PREFORMED ELASTOMERIC COMPRESSION JOINT SEALS FOR CONCRETE

SP2005-261

The provisions of MnDOT 3721 are hereby modified with the following:

S-90.1 Characteristics: The following is hereby inserted into MnDOT 3721.2A3 after Compression-Deflection

17.5 mm (11/16 inch) Seal:

Force @ 14 mm,	0.70 N/mm min.....MnDOT Method *(C)*
Force @ 0.55 inch pounds/linear inch	[4 min] .....MnDOT Method *(C)*
Force @ 10 mm,	3.50 N/mm max.....MnDOT Method *(C)*
Force @ 0.40 inch pounds/linear inch	[20 max] .....MnDOT Method *(C)*

S-90.2 Table 3721-2 is hereby deleted from MnDOT 3721.3C3 and replaced with the following:

TABLE 3721-2
SPECIFIED SPECIMEN SIZE AND TEST DEFLECTIONS

Nominal Width of Seal mm (inches)	Column A Specimen Length ± 5 mm (± 0.2 inch)	Column B Test Width for Min. Pressure mm (inches)	Column C Test Width for Max. Pressure mm (inches)
17.5 mm (11/16 inch)	100 mm (4 inch)	14mm (0.55 inch)	10 mm (0.40 inch)
20 mm (13/16 inch)	100 mm (4 inch)	16.5mm (0.65 inch)	10 mm (0.41 inch)
32 mm (1-1/4 inch)	100 mm (4 inch)	25.0 mm (1.00 inch)	11 mm (0.44 inch)
50 mm (2 inch)	150 mm (6 inch)	41.0 mm (1.62 inch)	17 mm (0.69 inch)
90 mm (3-1/2 inch)	150 mm (6 inch)	75.0 mm (3.00 inch)	35 mm (1.38 inch)

S-91 (3753) TYPE 1-D MEMBRANE CURING COMPOUND

(2011 Version)
SP2005-262

The following is hereby added to the MnDOT Standard Specifications:

3753 TYPE 1-D MEMBRANE CURING COMPOUND

3753.1 SCOPE

Provide clear or translucent liquid membrane forming curing compounds with a Type 1-D fugitive dye for spray application on portland cement colored or stamped surfaces, where a finished white surface would mask the decorative finished concrete surface when exposed to the air.

3753.2 REQUIREMENTS

A General

Provide membrane curing compound meeting the following requirements:

- All membrane-curing compounds pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available from the Approved Products list,
- Meets the requirements of the MnDOT Curing Compound Manufacturer Approval Program, as listed in the MnDOT Approved Products List, including pre-testing of materials by the manufacturer,
- Meets the requirements of ASTM C 309, Type 1-D Curing Compound, and
- The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date.

The Contractor may use Type 1-D curing compound in other concrete applications as approved by the Engineer or as shown on the Special Provisions. Use of any other Type 1 curing compound is at the discretion of the Engineer in conjunction with the Concrete Engineer.

3753.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test the material at an application rate of 200 sq. ft. per gal [5 sq. m per L].

S-92 (3754) POLY-ALPHA METHYLSTYRENE (AMS) MEMBRANE CURING COMPOUND

(2011 Version)
SP2005-263

MnDOT 3754 is hereby deleted and replaced with the following:

3754 POLY-ALPHA METHYLSTYRENE (AMS) MEMBRANE CURING COMPOUND

3754.1 SCOPE

Provide poly-alpha methylstyrene liquid membrane curing compounds for spray application on portland cement concrete surfaces exposed to the air.

3754.2 REQUIREMENTS

Provide membrane-curing compound meeting the following requirements:

(1) All membrane-curing compounds pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available from the Approved Products list.
(2) Meets the requirements of the MnDOT Curing Compound Manufacturer Approval Program, including pre-testing of all materials by the manufacturer.
(3) Meets the requirements of ASTM C 309 for the type required by the Contract.
(4) The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date.
(5) White pigmented Type 2, Class B.
(6) Resin is 100 percent poly-alpha methylstyrene.

Table 3754-1
Requirements for 3754 AMS Curing Compound

Properties	Range
Total solids, % by weight of compound	≥ 42
% reflectance in 72 h (ASTM E 1347)	≥ 65
Loss of Water, kg/sq. m in 24 h (ASTM C 156)	≤ 0.15
Loss of Water, kg/sq. m in 72 h (ASTM C 156)	≤ 0.40
Settling Test, ml/100 ml in 72 h*	≤ 2
V.O.C. Content, g/L	≤ 350
Infrared Spectrum, vehicle ‖	100% α methylstyrene

* Test in accordance with the method on file at the Materials Laboratory.
‖ Match the infrared scan for the dried vehicle from the curing compound to the infrared scan on file at the Materials Laboratory

3754.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test the material at an application rate of 200 sq. ft per gal [5 sq. m per L].

S-93 (3755) LINSEED OIL MEMBRANE CURING COMPOUND

(2011 Version)

SP2005-264

The following is hereby added to the MnDOT Standard Specifications:

3755 LINSEED OIL MEMBRANE CURING COMPOUND

3755.1 SCOPE

Provide extreme service white pigmented, heavy bodied linseed oil emulsion for application as a membrane cure and sealer.

3755.2 REQUIREMENTS

Provide membrane curing compounds meeting the following requirements:

(1) All membrane-curing compounds pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available from the Approved Products list.
(2) Meets the requirements of the MnDOT Curing Compound Manufacturer Approval Program, including pre-testing of materials by the manufacturer,
(3) Composed of a blend of boiled linseed oil and high viscosity, heavy bodied linseed oil emulsified in a water solution meeting the requirements of ASTM C 309, Type 2, except the Department will waive the drying time,
(4) The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date,
(5) Sprayable at temperatures of at least 40° F [4° C], and
(6) Chemical requirements in accordance with the following table:

Table 3755-1
Chemical Requirements of Linseed Oil Membrane Curing Compound
(volumes exclusive of added pigment)

Material Requirements	Percent by Weight
Oil phase (50% ± 4% by volume):	
Boiled linseed oil	80
Z-8 viscosity linseed oil	20
Water phase (50% ± 4% by volume)	100

3755.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test membrane curing compound at an application rate of 200 sq. ft per gal [5 sq. m per L].

S-94 (3861) PLANT STOCK

SP2005-265

The provisions of MnDOT 3861 are supplemented and/or modified with the following:

S-94.1 The third to last paragraph of MnDOT 3861.3 Sampling and Inspection, is revised to read as follows:

During the spring planting season, coniferous plants that have candled out (put out new growth) while being stored in a holding bin may be planted, however, coniferous plants that are dug after candling out will be rejected. Coniferous trees not fully branched from bottom to top will be rejected. Only coniferous trees with buds or new growth at the terminal ends of branches shall be accepted, provided the tree meets the dimensional requirements defined in the current edition of the "Inspection and Contract Administration Manual for MnDOT Landscape Projects". Sheared

or previously de-budded conifers may have enlarged trunk growth that is out of balance with a typical transplanted root system that is now too small. Therefore, previously sheared or de-budded coniferous trees will be subject to the minimum trunk caliper to root ball size relationship for deciduous trees as defined in the current edition of the "Inspection and Contract Administration Manual for MnDOT Landscape Projects". Pine trees shall have a terminal leader bud and terminal leaders shorter than 500 mm (18 inches) in length. A new central leader must be trained in conifers delivered with multiple or missing leaders.

S-95 (3876) SEED

SP2005-266

The provisions of MnDOT 3876 are supplemented and/or modified with the following:

S-95.1 The second paragraph of MnDOT 3876.1 is hereby deleted and replaced with the following:

Pure live seed (PLS) is the percent of seed germination plus dormant and/or hard seed times the percent of seed purity of each species divided by 100.

S-95.2 MnDOT 3876.2A General Requirements is hereby deleted and replaced with the following:

A General Requirements

All seed lots shall conform to the latest seed law of the State (Minnesota Statutes 21.80-21.91, last revised 8/2/06), and any applicable federal regulations, including those governing labeling and weed seed tolerances. Seed lots sold or offered for sale in the state of Minnesota are subject to inspection, sampling, and testing for verification of label claims and compliance with the Minnesota Seed Law by the Department of Agriculture (M.S. 18J.04). Tolerances for germination and purity factors will be applied as established in Rules 1510.0050, 1510.0060, 1510.0070, 1510.0080, 1510.0090 and 1510.0100 to seed lots sampled and tested by official methods. For all seed used in MnDOT mixes or projects, tests for viability (including germination and TZ tests) are valid for 12 months from the test date, exclusive of the month the test was completed. Seed shall be installed while tests are still valid.

All legume seed, including native legumes, shall have been pre-inoculated with the proper bacterial culture for the species being inoculated and with the bacteria culture designed for this purpose (pre-inoculation), in the manner and within the time specified by the manufacturer.

A1 Labeling

Contractor shall supply seed that is labeled according to the labeling requirements for agricultural seed as set forth in the Minnesota Seed Law, section 21.82. The Contractor shall supply seed that also contains the following information:

a) County of genetic origin for each native component (List at least two counties for germplasm comprising accessions from multiple counties)
b) PLS percent for each mix component (Purity x Total Germination and Hard or Dormant Seed/100) for each mix component (For PLS component of mix's)
c) Total PLS weight for the bag. The tag shall identify this as the pay item. (For PLS component of mix's)
d) Total bulk weight for the bag
e) Area covered by the amount of seed in the bag when applied at the rate specified for the mix
f) All information pertaining to individual components in a mix is required for all components, including those that constitute less than 5% of the total mix.

Tags must not be hand written. If any of the above mentioned information is not included on the tag the material will be subject to specification 1503. When multiple bags are required to keep certain species or groups of species separate for the purpose of seeding those bags may be placed inside of a larger bag as long as each bag is labeled separately and the outer bag is labeled with the name of the mix.

Each package of seed must include a "Certified Vendor" tag that is issued by MnDOT Erosion Control unit. This will indicate that the seed has come from a MnDOT Approved Seed Vendor as described in 3876.3.

A2 Seed Cleaning

Contractor shall use seed that has been cleaned to an extent sufficient to allow its passage through appropriate seeding equipment. Seed of introduced species must be suitable for use in conventional seeders. Seed of native species must be suitable for use in native seed drills without plugging up the boxes, drop tubes, or planting units of the seed drills. Contractor shall not use seed that has been conditioned so much that it suffers reduced viability as a result.

A3 Substitutions

Alternate species or germplasm may only be used by requesting permission from the Office of Environmental Services Turf and Erosion Control Engineering Unit. Requests for permission must include written proof from three potential suppliers that the specified germplasm is not available. Approved substitutions will be named in a memo at the time they are approved. All currently approved substitutions will be posted on the Office of Environmental Services Erosion Control Unit website. Use of germplasm not listed herein will be considered unacceptable and will be subject to 1503.

A4 Requirements for seed of native species

Contractor shall supply and plant all seed in the 300 series mixes as pure live seed (PLS). This includes the cover crop, grass, sedge, and forb components. All seed in the cover crop component of mixes in the 300 series must be certified by the Minnesota Crop Improvement Association (MCIA) or the appropriate seed certifying agency in the seed's state of origin, if other than Minnesota.

All native seed used in mixes in the 300 series shall be certified by the Minnesota Crop Improvement Association (MCIA) in the Source Identified class. The genetic origin for this seed shall be within Minnesota or eastern North Dakota, eastern South Dakota, northern Iowa, or western Wisconsin.

Source Identified seed shall be accompanied by the appropriate quality mark documentation from the MCIA, in the form of a MCIA-labeled yellow tag or certification certificate. County of genetic origin shall be clearly identified on the seed label for all native seed. Selected class and Tested class germplasm of native species listed in Table 3876-1 located on the website of the Office of Environmental Services Erosion Control unit may be used in 100 and 200 series seed mixtures.

If a specified species or germplasm is not available, substitutions will be granted for native seed in the 300 series mixes according to the following order of preference:

1) First preference, MCIA certified Source Identified class with a genetic origin in Minnesota or eastern North Dakota, eastern South Dakota, northern Iowa, or western Wisconsin
2) Second Preference: Source Identified seed certified by a seed certifying agency other than MCIA but with a genetic origin in Minnesota or eastern North Dakota, eastern South Dakota, northern Iowa, or western Wisconsin
3) Third Preference: Certified seed of varieties/germplasm listed in Table 3876-1.
4) Fourth Preference: Wild Type from Minnesota or eastern North Dakota, eastern South Dakota, northern Iowa, or western Wisconsin. Wild type seed is defined as seed of a local or regional ecotype that has originated from remnant native stands and that has not undergone any intentional selection process.

S-95.3 MnDOT Table 3876-1 is hereby deleted and replaced with the following:

TABLE 3876-1
NATIVE GRASSES
SEED COUNTS AND ACCEPTABLE GERMPLASM

Trade Name	Scientific Name+	Acceptable Varieties/Germplasm*	Seeds Per Pound
Big Bluestem	Andropogon gerardi	Bonilla, Bison	131,200
Sideoats Grama	*Bouteloua curtipendula*		96,000
Blue Grama	*Bouteloua gracilis*		640,000
Fringed Brome	*Bromus ciliatus*		160,000
Kalm's Brome	*Bromus kalmii*		128,000
Hairy wood chess	*Bromus purgans*		121,600
Buffalo grass	*Buchloe dactyloides*		51,200
Blue-joint grass	*Calamagrostis Canadensis*		3,360,000
Bottle Brush Sedge	*Carex comosa*		384,000
Tussock Sedge	*Carex stricta*		848,000
Fox Sedge	*Carex vulpinoidea*		1,440,000
Canada Wild Rye	*Elymus canadensis*	Mandan	67,200
Bottle brush grass	*Elymus hystrix*		75,200
Slender Wheat Grass	*Elymus trachycaulus*	Revenue	135,000
Virginia Wild Rye	*Elymus virginicus*		62,400
Western Wheat Grass	*Elytrigia smithii*		113,600
Reed Manna Grass	*Glyceria grandis*		1,280,000
Fowl Manna Grass	*Glyceria striata*		2,560,000
Common rush	*Juncus effusus*		16,000,000
June Grass	*Koeleria macrantha*		2,400,000
Switch Grass	*Panicum virgatum*	Forestburg, Dacotah	224,000
Fowl Bluegrass	*Poa palustris*		2,080,000
Canada Bluegrass	*Poa compressa*		2,400,000
Little Bluestem	*Schizachyrium scoparium*	Itasca Germplasm	140,800
Green Bulrush	*Scirpus atrovirens*		2,240,000
Wool-grass	*Scirpus cyperinus*		2,880,000
Soft-stem Bulrush	*Scirpus validus*		496,000
Indian Grass	*Sorghastrum nutans*	Tomahawk	132,800
Prairie Cordgrass	*Spartina pectinata*	Red River Germplasm	105,600
Rough Dropseed	*Sporobolus asper*		480,000
Sand Dropseed	*Sporobolus cryptandrus*		3,200,000
Prairie Dropseed	*Sporobolus heterolepsis*		224,000
Green Needle Grass	*Stipa viridula*		120,000

* Varieties listed are approved for use in 100 and 200 series mixes. Their substitution for MCIA Source Identified seed in 300 series mixes is only allowed upon satisfaction of the requirements of 3876.2 A5. When multiple varieties are listed for a single species, they are listed in order of preference.

S-95.4 Delete MnDOT 3876.2B Requirements for Native Grasses, Sedges, Rushes (label and paragraphs) and replace with:

B Requirements for Native Grasses, Sedges, and Rushes .....Table 3876-1
(Keep table 3876-1)

S-95.5 Delete MnDOT 3876.2E Requirements for Native Forbs (Wildflowers): (label and paragraphs) and replace with:

E Requirements for Native Forbs (Wildflowers).....Table 3876-4
(Keep table 3876-4)

S-95.6 Mixtures 260 and 270 in MnDOT Table 3876-5 are hereby deleted and replaced with the following:

Mixture: 260			
Common Name	Bulk Rate		% of Mix Component
	kg/ha	lb/ac	
Bluegrass, Kentucky "Certified Park"	35.8	40	32.0
Bluegrass, Canada	11.2	12.5	10.0
Bluegrass, Kentucky - Low Maintenance[1]	33.6	37.5	30.0
Fescue, hard	9.0	10	8.0
Rye-grass, perennial	22.4	25	20.0
GRAND TOTALS:	112	125	100.0
[1] Any accepted low maintenance Kentucky Bluegrass Except "Park" *Purpose: Commercial Turf*			

Mixture: 270			
Common Name	Bulk Rate		% of Mix Component
	kg/ac	lb/ac	
Bluegrass, Kentucky - Elite	33.6	37.5	25.0
Bluegrass, Kentucky - Improved	33.6	37.5	25.0
Bluegrass, Kentucky - Low Maintenance	33.6	37.5	25.0
Red fescue, creeping	10.8	12	8.0
Rye-grass, perennial	22.8	25.5	17.0
GRAND TOTALS:	134.4	150	100.0
Purpose: Residential Turf			

S-95.7 The 300 series mixes from MnDOT Table 3876-5 are hereby deleted and replaced with the following:

Table 3876-5

Mixture: 310			
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Bluestem, big	2.8	2.5	25.0
Indian grass	2.8	2.5	25.0
Wild-rye, Virginia	2.2	2.0	20.0
Switch grass	0.6	0.5	5.0
Blue-joint grass	0.3	0.25	2.5
Green bulrush	0.3	0.25	2.5
Wool grass	0.3	0.25	2.5
Giant bur reed	0.3	0.25	2.5
Cordgrass, prairie	1.7	1.5	15.0
Grass Totals:	11.3	10.0	100.0
	kg/ha	lb/ac	
Winter Wheat*	62.7	56.0	80.0
Rye-grass, annual	12.5	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	78.3	70	100.0
Wet Forbs Mixture (Table 3876-6)	2.2	2.0	100.0
GRAND TOTALS:	91.8	82.0	100.0
*Oats to be substituted for spring plantings			
Purpose: Native mix for wetter areas. Infiltration ponds, dry ponds, wet ditches. Tall height.			

Mixture: 325			
Common Name	PLS Rate kg/ha	PLS Rate lb/ac	% of Mix Component
Bluestem, big	1.7	1.5	15.0
Fringed brome	1.7	1.5	15.0
Wheat grass, slender	1.7	1.5	15.0
Virginia wild-rye	1.7	1.5	15.0
Switch grass	0.6	0.5	5.0
Fowl bluegrass	1.7	1.5	15.0
Indian grass	1.7	1.5	15.0
Prairie cord grass	0.6	0.5	5.0
Grass Totals:	11.4	10.0	100.0
Common Name	PLS Rate kg/ha	PLS Rate lb/ac	% of Mix Component
Blue-joint grass	0.22	0.2	10.0
Bottlebrush sedge	0.34	0.3	15.0
Tussock sedge	0.22	0.2	10.0
Fox sedge	0.22	0.2	10.0
Reed manna grass	0.22	0.2	10.0
Fowl manna grass	0.22	0.2	10.0
Green bulrush	0.22	0.2	10.0
Wool grass	0.22	0.2	10.0
Soft-stem bulrush	0.34	0.3	15.0
Sedge Totals:	2.22	2.0	100.0
Common Name	PLS Rate kg/ha	PLS Rate lb/ac	% of Mix Component
Winter Wheat*	61.6	56	80.0
Rye-grass, annual	12.3	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	77	70	100.0
Wet Forbs Mixture (Table 3876-6)	2.2	2.0	100.0
GRAND TOTALS:	92.8	84.0	100.0
*Oats to be substituted for spring plantings			
Purpose: Native sedge/prairie meadow mix. Reaches a height of 915 mm to 1220 mm (36 to 48 inches). Developed for use on hydric soils and for wetland restoration.			

Mixture: 328			
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Bluestem, big	2.2	2	12.5
Brome, fringed	2.2	2	12.5
Wild-rye, Virginia	4.4	4	25.0
Switchgrass	1.1	1	6.3
Bluegrass, fowl	5.5	5	31.2
Indian grass	2.2	2	12.5
Grass Totals:	17.6	16.0	100.0
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Winter Wheat*	61.6	56.0	80.0
Rye-grass, annual	12.3	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	77	70	100.0
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Milkweed, marsh	0.33	0.3	15.0
Prairie clover, purple	0.33	0.3	15.0
Tic-trefoil, showy	0.33	0.3	15.0
Sunflower, early	0.33	0.3	15.0
Black-eyed Susan	0.55	0.5	25.0
Vervain, blue	0.33	0.3	15.0
Economy Forbs Totals:	2.2	2.0	100.0
GRAND TOTALS:	96.8	88.0	100.0
*Oats to be substituted for spring plantings			
Purpose: Native mix for infiltration ponds, dry ponds, temporary wet ditches. Tall height.			

Mixture: 330			
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Grama, sideoats	3.4	3.0	21.5
Grama, blue	2.8	2.5	18.0
Bluestem, little	3.9	3.5	25.0
June grass	1.1	1.0	7.0
Dropseed, sand	1.1	1.0	7.0
Wild-rye, Canadian	3.4	3.0	21.5
Grass Totals:	15.7	14.0	100.0
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Winter Wheat*	62.7	56.0	80.0
Rye-grass, annual	12.5	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	78.3	70	100.0
Dry Forbs Mixture (Table 3876-6)	0.6	0.5	100.0
GRAND TOTALS:	94.6	84.5	100.0
*Oats to be substituted for spring plantings			
Application: Native mix for Sandy/dry areas. Short height.			

Mixture: 340			
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Bluestem, big	3.3	3.0	21.5
Bluestem, little	2.8	2.5	18.0
Wild-rye, Canadian	2.2	2.0	14.0
Grama, sideoats	2.2	2.0	14.0
Switch grass	0.6	0.5	4.0
Dropseed, sand	0.6	0.5	3.5
Bluegrass, Canada	3.4	3.0	21.5
June grass	0.6	0.5	3.5
Grass Totals:	15.7	14.0	100.0
Common Name	PLS Rate		% of Mix Component
	kg/ha	lb/ac	
Winter Wheat*	62.7	56.0	80.0
Rye-grass, annual	12.5	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	78.3	70	100.0
Dry Forbs Mixture (Table 3876-6)	0.6	0.5	100.0
GRAND TOTALS:	94.6	84.5	100.0
*Oats to be substituted for spring plantings			
Purpose: Native mix for Sandy/Dry areas. Mid-height.			

Mixture: 350			
Common Name	PLS Rate kg/ha	PLS Rate lb/ac	% of Mix Component
Bluestem, big	3.4	3.0	21.5
Indian grass	2.8	2.5	18.0
Bluestem, little	2.8	2.5	18.0
Grama, sideoats	3.4	3.0	21.5
Wild-rye, Canadian	2.2	2.0	14.0
Switch grass	1.1	1.0	7.0
Grass Totals:	15.7	14.0	100.0
Common Name	PLS Rate kg/ha	PLS Rate lb/ac	% of Mix Component
Winter Wheat*	62.7	56.0	80.0
Rye-grass, annual	12.5	11.2	16.0
Wheatgrass, slender	3.1	2.8	4.0
Cover Crop Totals:	78.3	70	100.0
Mesic Forbs Mixture (Table 3876-6)	0.6	0.5	100.0
GRAND TOTALS:	94.6	84.5	100.0
*Oats to be substituted for spring plantings			
Application: Native mix for general roadside areas.			

S-95.8 MnDOT Table 3876-6 is hereby deleted and replaced with the following:

Table 3876-6

Mixture: Mesic Forbs		
Common Name	Botanical Name	% of Mix
Aster, smooth-blue	*Aster laevis*	5.0
Milkvetch, Canada	*Astragalus canadensis*	5.0
Prairie clover, white	*Dalea candidum*	5.0
Prairie clover, purple	*Dalea purpureum*	5.0
Tick-trefoil. Showy	*Desmodium canadense*	5.0
Coneflower, narrow-leaved	*Echinacea angustifolia*	5.0
Ox-eye, common	*Heliopsis helianthoides*	5.0
Coneflower, grey-headed	*Ratibida pinnata*	5.0
Blazingstar, rough	*Liatris aspera*	5.0
Blazingstar, tall	*Liatris pycnostachya*	5.0
Bergamot, wild	*Monarda fistulosa*	5.0
Penstemon, showy	*Penstemon grandiflorum*	5.0
Mint, mountain	*Pycnathemum virginianum*	5.0
Coneflower, columnar	*Ratibida columnifera*	5.0
Black-eyed Susan	*Rudbeckia hirta*	5.0
Goldenrod, stiff	*Solidago rigida*	5.0
Vervain, blue	*Verbena hastata*	5.0
Vervain, hoary	*Verbena stricta*	5.0
Alexanders, heart-leaved	*Zizea aptera*	5.0
Alexanders, golden	*Zizia aurea*	5.0
	Total:	100.0
Rate: 0.6 kg/ha (½ pounds per acre) PLS.		

Mixture: Dry Forbs		
Common Name	Botanical Name	% of Mix
Leadplant	*Amorpha canescens*	10.0
Milkweed, butterfly	*Asclepias tuberosa*	2.0
Aster, heath	*Aster ericoides*	4.0
Tic-seed, stiff	*Coreopsis palmate*	2.0
Yarrow	*Achillea millefolium*	2.0
Long-leaved bluets	*Hedyotis longifolia*	1.0
Bushclover, round-headed	*Lespedeza capitata*	3.0
Blazingstar, rough	*Liatris aspera*	4.0
Blazingstar, dotted	*Liatris punctata*	3.0
Lupine, wild	*Lupinus perennis*	5.0
Prairie clover, white	*Dalea candidum*	5.0
Prairie clover, purple	*Dalea purpureum*	16.0
Prairie rose	*Rosa arkansana*	1.0
Black-eyed susan	*Rudbeckia hirta*	18.0
Goldenrod, gray	*Solidago nemoralis*	3.0
Goldenrod, upland	*Solidago ptarmicoides*	1.0
Goldenrod, stiff	*Solidago rigida*	2.0
Goldenrod, showy	*Solidago speciosa*	2.0
Vervain, hoary	*Verbena stricta*	14.0
Alexander's,golden	*Zizea aurea*	2.0
	Total:	100.0
Rate: 0.6 kg/ha (½ pounds per acre) PLS		

Mixture: Wet Forbs		
Common Name	Botanical Name	% of Mix
Hyssop, fragrant giant	*Agastache foeniculum*	2.0
Water plantain	*Alisma subcordatum*	4.0
Meadow garlic	*Allium canadense*	1.0
Anemone, Canada	*Anemone Canadensis*	1.0
Milkweed, marsh	*Asclepias incarnata*	2.0
Aster, panicled	*Aster simplex*	3.0
Aster, New England	*Aster novaeangliae*	3.0
Aster, red-stalked	*Aster puniceus*	3.0
Aster, flat-topped	*Aster umbellatus*	1.0
Tick trefoil, Canada	*Desmodium glutinosum*	1.0
Joe-pye weed	*Eupatorium maculatum*	17.0
Boneset	*Eupatorium perfoliatum*	10.0
Goldenrod, grass-leaved	*Solidago graminifolia*	2.0
Sneezeweed	*Helenium autumnale*	1.0
Giant sunflower	*Helianthus giganteus*	2.0
Ox-eye, common	*Heliopsis helianthoides*	1.0
Great St. John's wort	*Hypericum pyvamidatum*	2.0
Iris, wild	*Iris versicolor*	1.0
Blazingstar, tall	*Liatris pycnostachya*	8.0
Bergamot, wild	*Monarda fistulosa*	1.0
Prairie clover, white	*Dalea candidum*	1.0
Prairie clover, purple	*Dalea purpureum*	2.0
Mountain mint	*Pycnathemum virginianum*	1.0
Black-eyed susan	*Rudbeckia hirta*	6.0
Goldenrod, stiff	*Solidago rigida*	2.0
Tall meadow rue	*Thalictrum dasycarpum*	2.0
Vervain, blue	*Verbena hastata*	14.0
Ironweed	*Veronia fasciculate*	1.0
Culver's root	*Veronicastrum virginicum*	3.0
Alexander's, golden	*Zizea aurea*	2.0
	Total:	100.0
Rate: 2.2 kg/ha (2 pounds/acre) PLS		

S-96 (3889) TEMPORARY DITCH CHECKS

SP2005-267

The provisions of MnDOT 3889 are supplemented and/or modified with the following:

S-96.1 MnDOT 3889.2B Type 2: Bioroll, is revised to read as follows:

Type 2 ditch checks shall consist of 3897 Filter Log Type; Straw Bioroll or Wood Fiber Bioroll.

S-96.2 MnDOT 3889.2C Type 3: Bioroll Blanket System, is revised to read as follows:

Type 3 ditch checks shall consist of two components; Filter Log Type; Straw Bioroll or Wood Fiber Bioroll in accordance with 3897, staked on top of a Category 3, specification 3885 erosion control blanket. The blanket shall form a minimum width of 3.7 m (12 feet) perpendicular to the ditch gradient.

S-97 (3891) STORM DRAIN INLET PROTECTION

SP2005-268

The provisions of MnDOT 3891 are supplemented and/or modified with the following:

S-97.1 MnDOT 3891.3A Rock Log, is revised to read as follows:

Rock logs shall meet the requirements of 3897.2 Filter Log Type Rock Log.

S-97.2 MnDOT 3891.3B Compost Log, is revised to read as follows:

Compost logs shall meet the requirements of 3897.2 Filter Log Type Compost Log

DIVISION SL – CERTIFICATION

LIGHTING SPECIAL PROVISIONS

for

C.S.A.H. 60 and C.S.A.H. 82 Roundabout

S.A.P. 007-660-005 & S.A.P. 007-682-008

Mankato,

Blue Earth County, MN

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: Bryan T. Nemeth

Bryan T. Nemeth, P.E., P.T.O.E.

License No. 43354

Date: 2/24/2012

DIVISION SL

SL-1 (1802) QUALIFICATION OF WORKERS

The provisions of Mn/DOT Specification 1802 are hereby supplemented with the following:

Signal and Lighting Certification will be required for all Contractors, Supervisors or Foremen involved in the field installation of the Traffic Signal and/or Lighting portion of this Project. Signal and Lighting Certification, Level II, is available through the Mn/DOT Office of Traffic, Safety, and Technology (OTST). Questions regarding certification or past certification may be directed to the Mn/DOT Office of Traffic, Safety, and Technology (OTST) at Telephone No. (651) 234-7055.

Certified Contractor personnel shall be on the Project work site at all times to perform or directly supervise the installation of a Traffic Signal System or a Lighting system.

SL-2 (2104) REMOVING MISCELLANEOUS STRUCTURES

SL-2.1 DESCRIPTION

This work shall consist of removing or salvaging miscellaneous structures in accordance with the provisions of Mn/DOT 2104 and the following:

Salvaged items shall be stored and protected from damage by the contractor until ready for reinstallation or delivery to storage. Any damage resulting from the Contractor's operations shall be repaired or replaced like in kind or better to that condition existing prior to the salvage operation.

Existing lighting service cabinets and other painted items may have been painted with lead-based paint. If this is the case, the Contractor shall be responsible for the proper handling, transportation, and disposal of these materials as hazardous waste and the handling, transportation, and disposal of these items shall be in accordance with Occupational Safety & Health Administration (OSHA) and the Minnesota Pollution Control Agency (MPCA) regulations.

The Contractor certifies that he or she is familiar with, and will comply with, the applicable requirements in OSHA 29 CFR 1926.62 and Minnesota Rules Chapter 5206, 7025, 7035, 7045 relating to disposal and/or the removal of these lead painted materials.

SL-2.2 MATERIALS

None

SL-2.3 CONSTRUCTION REQUIREMENTS

A. Remove Light Standard Base

Item 2104.509 (Remove Light Standard Base) shall consist of removing the in place light standard base as indicated in the Plan. All holes remaining from the removal of the light standard base must be backfilled in accordance with Mn/DOT 2545.3C.

B. Remove Underground Wire

Item 2104.501 (Remove Underground Wire) shall consist of removing cables from the in-place lighting unit to the source of power as indicated in the Plan and as directed by the Engineer. Removed cables shall become the property of the Contractor.

C. Remove Non-Metallic Conduit

Item 2104.501 (Remove Non-Metallic Conduit) shall consist of removing conduit as indicated in the Plan and as directed by the Engineer. Removed conduit shall become the property of the Contractor. All holes remaining from the removal of the conduit must be backfilled in accordance with Mn/DOT 2545.3C.

D. Salvage Lighting Unit

Item 2104.523 (Salvage Lighting Unit) shall consist of salvaging the lighting unit as indicated in the Plan and as directed by the Engineer. The lighting unit includes pole, mast arm, luminaire, lamp, transformer base, and base anchorage. Salvaged lighting units shall be delivered to storage location as specified herein, or as directed by the Engineer. Any damage to the salvaged materials resulting from the hauling operation shall be repaired and replaced at the Contractor's expense. All salvaged lighting units shall be removed from the project site within 8 hours from disconnection from the light bases.

E. Modify Feed Point

Item 2545.602 (Modify Feed Point) shall consist of modifying the feed point of the existing lighting as needed to remove the power to the salvaged lighting unit. Modification of the feed point for the new lighting system shall be paid for under Item No. 2545.601 (LIGHTING SYSTEM A).

F. Delivery of Salvaged Materials

Salvaged materials shall be disassembled as directed by the Engineer and, unless otherwise specified, shall be delivered to the City of Mankato. The Contractor shall notify Mr. Landon Bode (507-387-8637) of the City of Mankato at least three (3) normal working days in advance of the time the

Contractor intends to deliver the salvaged materials. **THE ENGINEER SHALL BE NOTIFIED IN ADVANCE OF NOTIFICATION TO MR. BODE.**

SL-3 (2545) ELECTRIC LIGHTING SYSTEMS

This work shall consist of furnishing labor, equipment, and materials for construction of an electric lighting system in accordance with the applicable provisions of Mn/DOT 2471, Mn/DOT 2545, current edition of the National Electric Code, the Plans, and the following:

SL-3.1 GENERAL

A. "As Built Plans"

The Contractor shall furnish "as built Plans" that contain any **changes** in the following:

--- Cable locations.
--- Conduit locations.
--- Light pole locations.
--- Feedpoint locations.
--- Handhole locations.

Any discrepancy or additions between the final plan and how the lighting system was actually built **must be indicated** on the "as built plan".

The "as built Plans" shall be in a form that is satisfactory to the Engineer. The Contractor furnished "as built Plans" shall be considered incidental work.

SL-3.2 MATERIALS

A. Shop Drawings

THE CONTRACTOR SHALL PROVIDE SHOP DETAIL DRAWINGS FOR ALL MATERIALS AND ELECTRICAL EQUIPMENT AS SPECIFIED IN THE CONTRACT DOCUMENT

B. Conduit

The Contractor shall furnish and install either rigid steel conduit (R.S.C.) or non-metallic conduit (N.M.C.) at the locations indicated in the Plans. The size of the conduit shall be as indicated in the Plan. All conduit shall be in accordance with the following:

1. Rigid Steel Conduit (R.S.C.):

Shall be in accordance with Mn/DOT 3801.

2. Non-Metallic Conduit:

Shall be in accordance with Mn/DOT 3803, except as follows:

a. Shall be NRTL listed as being compliant with UL 651B.

b. All references to ASTM F 2160 shall be deleted.

c. Shall be Schedule 80 conduit and fittings for all installations.

d. For HDPE continuous type conduit, all conduit fittings shall be appropriate for use with HDPE continuous length conduit.

e. Shall be capable of being installed by plowing, trenching, or directional boring methods.

f. Shall be either "GREY" or "RED" in color.

g. Shall be marked on the outside of conduit indicating the following:

- Manufacturer's name
- Size of conduit
- Type of conduit (HDPE, etc.)
- NRTL Certification Mark
- Any other markings required by the N.E.C.

Before the cables and conductors are installed, non-metallic conduit bell ends (**appropriately sized for the HDPE type conduit**) shall be installed to prevent damage to the cables and conductors

All conduit from concrete foundations to the nearest handhole shall be either rigid steel conduit (R.S.C.) or rigid non-metallic conduit (N.M.C.). **HDPE continuous length conduit is not allowed for use between concrete foundations and the nearest handhole.**

All conduit installed from the Source of Power (SOP) to the lighting cabinet shall be R.S.C.

C. Handholes

New Handholes shall be Mn/DOT approved PVC Handholes with Metal Handhole Frames and Covers as listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

http://www.dot.state.mn.us/products/index.html

D. Luminaire Wire Holder

The Contractor shall furnish and install a wire holder that supports the luminaire cable/conductors within the end of the luminaire slipfitter near the connection point of the luminaire. Mn/DOT approved Wire Holders are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

E. Aboveground Splices

Aboveground splices shall be in accordance with the provisions of Mn/DOT 2545.3G4 and 2565.3J4. When above ground splices are allowed, the Contractor may substitute approved insulated wire splice connector blocks for the specified "split bolt" connector:

Mn/DOT approved Insulated Wire Splice Connector Blocks are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

The Contractor shall apply two layers of protective vinyl electrical tape over the insulated wire splice connector blocks in the area where the conductors enter the block and extend the wrap at least one (1) inch over the incoming conductor insulation.

F. Above Ground Wiring

Above ground wiring in roadway lighting standards shall be in accordance with Mn/DOT 2545.3G3 and as follows:

The term "14-2 UF" shall be deleted the term "12-2 UF with ground" shall be inserted.

Fuse holders shall be of the breakaway type.

Shall have 6 amp fuses when a 240/480 volt system is installed and 8 amp fuses when a 120/240 volt system is installed.

Mn/DOT approved Fuse Holders are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

After the conductors have been crimped to the fuse holder the Contractor shall apply two layers of protective vinyl electrical tape over the breakaway fuse holder in the area where the conductors are crimped to the fuse holder. Cover any un-insulated portion of the fuse holder barrel and extend the

wrap at least one (1) inch over the incoming conductor insulation.

G. Underground Cable Splice

a. Two Way Underground Handhole Cable Splice

The Contractor shall furnish and install a two way underground handhole cable splice in accordance with the provisions of Mn/DOT 2545.3G4 and as follows:

1. Shall have adequate slack in the cable assembly to allow each individual cable to extend at least 3 feet above the top of the hand hole prior to stripping the cable.

2. Shall strip off the outer jacket of the cable assembly to within 6 inches of where the cable enters the handhole.

3. Shall un-wrap the copper shield to within 6 inches of where the cable enters the hand hole.

4. Shall have shields spliced together by drilling a hole in each piece of shielding and then bolting the pieces together with brass nuts, bolts and flat washers to form an electrical bond between the two pieces of copper shielding.

5. Shall apply pole base terminal block coating to the entire shield splice point.

Mn/DOT approved Pole Base Terminal Block Coatings are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

http://www.dot.state.mn.us/products/index.html

6. Shall splice each individual conductor of the 4 conductor cable assemblies separately.

7. Shall maintain proper circuit color identification within each splice.

8. Shall splice each conductor pair together using a NRTL listed compression –type butt splice barrel connector that is rated for the size of cable being spliced.

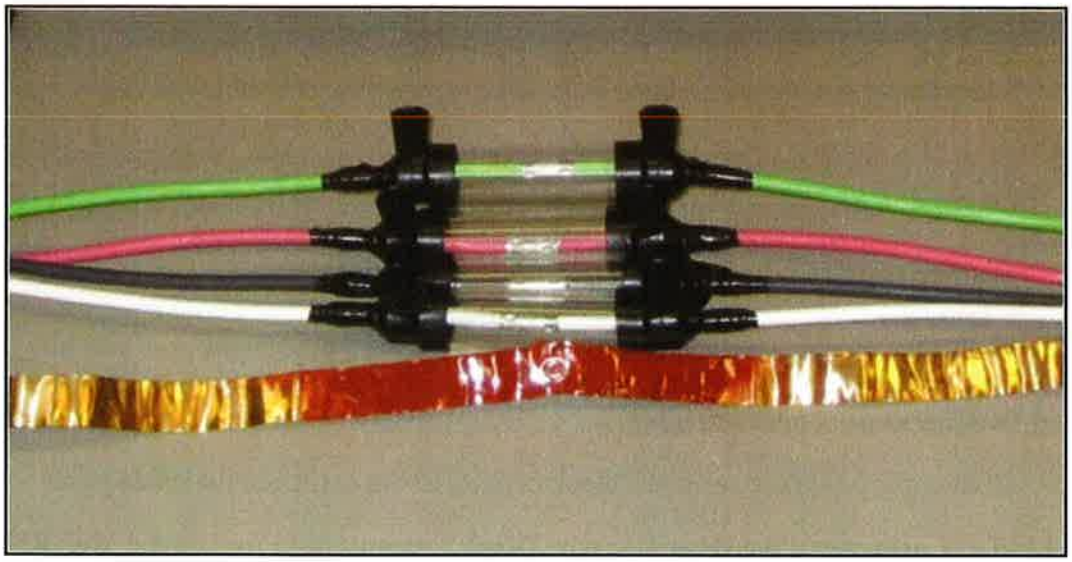
9. Shall use the manufacturer specific compression tool for crimping the barrel connector to the conductors.

10. Each individual conductor splice shall be separately encapsulated with a loop detector splice encapsulation kit.

Mn/DOT approved Loop Detector Splice Encapsulation Kits are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

http://www.dot.state.mn.us/products/index.html

11. The loop detector splice encapsulation kit shall be assembled per the manufacturer's installation instructions and as follows:
    a. Wrap electrical insulating tape around the end of each of the funnel assembly where it meets the conductor to prevent epoxy from leaking out of the mold prior to curing.



12. Shall allow the resin to harden and cool after which all conductors of the splice shall be tested and found in compliance with Mn/DOT 2545.3K1

b. Three Way Underground Handhole Cable Splice

The Contractor shall furnish and install a three way underground handhole cable splice in accordance with the provisions of Mn/DOT 2545.3G4 and as follows:

1. Shall have adequate slack in the cable assembly to allow each individual cable to extend at least 3 feet above the top of the hand hole prior to stripping the cable.

2. Shall strip off the outer jacket of the cable assembly to within 6 inches of where the cable enters the hand hole.

3. Shall un-wrap the copper shield to within 6 inches of where the cable enters the hand hole.

4. Shall have shields spliced together by drilling a hole in each piece of shielding and then bolting the pieces together with brass nuts, bolts and flat washers to form an electrical bond between the

three pieces of copper shielding.

5. Shall apply pole base terminal block coating to the entire shield splice point

Mn/DOT approved Pole Base Terminal Block Coatings are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Signals:

http://www.dot.state.mn.us/products/index.html

6. Shall splice each individual conductor of the 4 conductor cable assemblies separately.

7. Shall maintain proper circuit color identification within each splice.

8. Shall splice the three conductors together using a NRTL listed Split Bolt splice connector that is rated for the size and number of the conductors being spliced.

9. Shall insure the split bolt is adequately tightened.

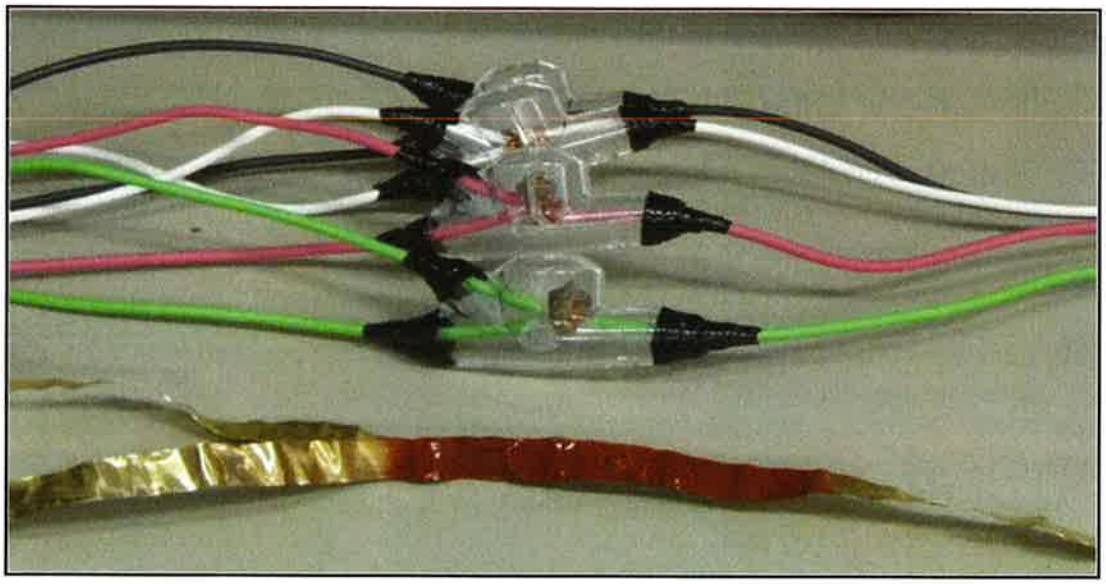
10. Each individual conductor splice shall be separately encapsulated with a 3 way power cable splice encapsulation kit.

Mn/DOT approved 3 Way Power Cable Splice Encapsulation Kits are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

11. The 3 way power cable splice encapsulation kits shall be assembled per the manufacturer's installation instructions and as follows:

    a. Wrap electrical insulating tape around the end of each Y on the assembly where it meets the conductor to prevent epoxy from leaking out of the mold prior to curing.



12. Shall allow the resin to harden and cool after which all conductors of the splice shall be tested and found in compliance with Mn/DOT 2545.3K1

H. Grounding Conductors

Bare #6 solid equipment grounding conductors shall be in compliance with Mn/DOT 3815.2B5 except the conductor shall be in compliance with ASTM B 3 soft or annealed copper.

I. Blank

J. Light Base, Design E

The Contractor shall furnish and install a concrete Light Base, Design E in accordance with Mn/DOT 2545.3F and Mn/DOT Standard Plate 8127, at the locations indicated in the Plan.

Except in paved areas, and with approval by the Engineer, the Contractor may furnish and install, as an alternative to the concrete Light Base Design E, a Light Base, Design Steel E. The Light Base, Design Steel E shall be as follows:

The Contractor shall furnish and install a Light Base, Design Steel E at the locations indicated in the Plan.

Mn/DOT approved Light Bases Design Steel E are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

The Light Base, Design Steel E is acceptable for installation in the following soils:

SOIL DESCRIPTIONS	Probe Values in.-lbs. (Nm)	Typical Blow Count "N" per ASTM-D1586
Dense sands, and gravel; hard silts and clays.	500-600 (65-78)	35-50
Medium dense sandy gravel; very stiff to hard silts and clays.	400-500 (52-65)	24-40
Medium dense coarse sand and sandy gravel; stiff to very stiff silt and clays.	300-400 (39-52)	14-25
Loose to medium dense fine to coarse sand; firm to stiff clays and silts.	200-300 (26-39)	7-14

K. Equipment Pad B

The Contractor shall furnish and install a complete concrete pad in accordance with Mn/DOT Standard Plate No. 8106, at the locations indicated in the Plan. The equipment pad shall be constructed in accordance with Mn/DOT 2545.3F except the concrete shall be Mix No. 3A32.

The equipment pad mentioned will be used for mounting of a lighting service cabinet. The reinforcement bars for use in the foundation shall conform to the requirements of Mn/DOT 3301.

L. Service Cabinet, Secondary Type L1 (120/240 VAC)

The Contractor shall furnish and install a Service Cabinet, Secondary Type L1, for supplying power to an electric lighting system, on an equipment pad concrete foundation at the location indicated in the Plans.

Mn/DOT approved Service Cabinet's Secondary Type L1 are listed on the Mn/DOT

Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

M. Lighting Unit Type Special 1

The Contractor shall furnish and install lightings units for Lighting System A in accordance with the applicable provisions of Mn/DOT 2545.2R, these Special Provisions, and the Plan.

The Lighting Unit Type Special 1 shall be as indicated in the Plans. Lighting Unit Type Special1 shall have one mastarm and be unpainted with frost finish as detailed in the Plan.

The Lighting Unit Design and Lamp associated with each Lighting Unit Type Special 1 shall be as detailed in these Special Provisions and the Plan:

Luminaires shall be equipped with Light Emitting Diode (LED) lamps and operate at a maximum of 350mA at 240 volts. The total luminaire operating wattage shall not exceed 139 watts. Luminaires shall be equipped with a NEMA twist-lock photocell receptacle and a shorting cap. 120 LED Luminaires shall be Holophane Legend LED Roadway Luminaire – Type III Medium, catalog number, LEDG-120-35-5K-AS-2-Z-L3-R-PSC and shall be installed where indicated in the Plan.

For each LED unit, the Contractor shall submit to the Engineer, for approval, five copies of all warranty information indicating the required 5-year warranty period **(from date of installation)**, product invoice, specifications, and documentation indicating name of manufacturer, model number, and serial number. Three copies shall be distributed by the Engineer as follows:

1. Mn/DOT State Aid Engineer.
2. Blue Earth County Engineer.
3. City of Mankato.

N. Lighting Unit Type Special 2

The Contractor shall furnish and install lightings units for Lighting System A in accordance with the applicable provisions of Mn/DOT 2545.2R, these Special Provisions, and the Plan.

The Lighting Unit Type Special 2 shall be as indicated in the Plans. Lighting Unit Type Special 2 shall have two mastarms and be unpainted with frost finish as detailed in the Plan.

The Lighting Unit Design and Lamp associated with each Lighting Unit Type Special 2 shall be as detailed in these Special Provisions and the Plan:

Luminaires shall be equipped with Light Emitting Diode (LED) lamps and operate at a maximum of 350mA at 240 volts. The total luminaire operating wattage shall not exceed 139 watts. Luminaires shall be equipped with a NEMA twist-lock photocell receptacle and a

shorting cap. 120 LED Luminaires shall be Holophane Legend LED Roadway Luminaire – Type III Medium, catalog number, LEDG-120-35-5K-AS-G-L3-R-PSC and shall be installed where indicated in the Plan.

For each LED unit, the Contractor shall submit to the Engineer, for approval, five copies of all warranty information indicating the required 5-year warranty period **(from date of installation)**, product invoice, specifications, and documentation indicating name of manufacturer, model number, and serial number. Three copies shall be distributed by the Engineer as follows:

1. Mn/DOT State Aid Engineer.
2. Blue Earth County Engineer.
3. City of Mankato.

SL-3.3 CONSTRUCTION REQUIREMENTS

A. Labeling of Lighting Cable

The direct buried lighting cables shall be installed in accordance with Mn/DOT 2545.3G2 and as follows:

All conductors in service cabinets and light pole bases shall be labeled **indicating the next termination point.** For example**, label cable(s):**

IN THE LIGHTING SERVICE CABINET, label would read:

TO POLE #1

IN POLE #1, labels would read:

TO LIGHING SERVICE CABINET
TO POLE #2

Labels to identify cables shall consist of white vinyl adhesive tape wrapped around the cable. The labeling shall be hand written on the vinyl adhesive tape or produced with a label maker. If label marking is handwritten, the labeling shall be accomplished by utilizing a black permanent marker, in such a manner, that the markings are legible to the satisfaction of the Engineer. Labels produced with a label maker shall be suitable for use in wet locations, and this label must wrap around the cable one complete revolution with some overlap.

B. Conduit Installation

Conduit shall be installed in accordance with Mn/DOT 2565.3D, except as follows:

Continuous Type HDPE Non-Metallic Conduit:

--- except for under existing pavements, underground Continuous Type HDPE Conduit shall be placed by trenching, stitching, plowing, or other method approved by the Engineer. Under existing pavements, Continuous Type HDPE Non-Metallic Conduit shall be placed as specified in 2565.3D2b.

Rigid Non-Metallic Conduit Joints:

--- the Contractor shall install appropriate sized long line couplings when installed under existing roadway surfaces

--- the applied PVC joint cement shall be allowed to set-up for six (6) hours before pulling the conduit through a directional bored channel.

Conduit in Handholes:

--- If the Contract requires the installation of a handhole within an direct buried lighting cable run, a 2 inch N.M.C. stub out shall be installed for each cable entering the handhole. The 2 inch N.M.C. stub out shall be a minimum of 36 inches in length with non-metallic bell ends installed on each open end of the conduit stub out to prevent damage to the direct buried lighting cable.

C. Handhole Installation

The Contractor shall install handholes in accordance with the provisions of Mn/DOT 2565.3E and as follows:

The required aggregate drain bed below the handhole shall be **compacted** before installation of the handhole.

All handholes shall be backfilled **after** the frame casting and cover have been installed onto the handhole.

D. Light Standard Installation

The Contractor shall install light standards in accordance with Mn/DOT 2545.3H and as follows:

1. The Contractor shall use only shims for leveling when installing aluminum light standards on light standard bases.

    a. Assemble the lighting unit in accordance with the manufacturer's requirements.

    b. Make certain that the holddown and connecting washers are installed in their proper locations.

2. The Contractor shall use only leveling nuts when installing stainless steel light standards on light standard bases.

3. Where leveling nuts are used, the leveling and top nuts shall both be securely tightened against the light standard base plate. Where shims are used the top nuts shall be securely tightened against the light standard base plate. The leveling nuts and top nuts shall be tightened as follows:

   --- the threads of the nuts shall be lubricated with a brush on anti seize lubricant and then the nuts shall be torqued to minimum 125 ft-lbs.
   required for 1 inch diameter anchorages.

   --- the threads of the nuts shall be lubricated with a brush on anti seize lubricant and then the nuts shall be torqued to minimum 240 ft-lbs.
   required for 1¼ inch diameter anchorages.

E. Light Standard or Light Unit Numbering and Service Cabinet Numbering

The Contractor shall number the light standards or light units (underpass luminaires, tunnel luminaires, special luminaires, etc.) and service cabinets in accordance with Mn/DOT 2545.3P.

Light standards shall be numbered with the complete feed point numbers and letters placed above the pole number regardless if complete numbering is shown in the Plan.

Light Standard Numbering shall consist of the entire feed point designation with the pole number placed below.

The Contractor shall also verify that the light standards and/or light units to be reinstalled are correctly numbered and if not the Contractor shall number the light standards and/or light units in accordance with Mn/DOT 2545.3P.

The outside of the lighting service cabinet shall be labeled in accordance with Mn/DOT 2545.3P and as follows:

In addition to the label on front door of the lighting service cabinet an additional label shall be placed on the side of the cabinet that faces traffic.

Mn/DOT approved Labels are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

http://www.dot.state.mn.us/products/index.html

Letters and numbers shall have a minimum stroke width of 0.35 inches.

F. Wiring in Light Standard Concrete Bases

The Contractor shall install conduits in light standard concrete foundations in accordance with the provisions of Mn/DOT 2545.3G. Approximately 2 feet of slack cable shall be left in each light standard base.

G. Light Base, Design Steel E

If used, the Light Base, Design Steel E installation is to be per the manufacturers recommended procedures and accomplished by either a boom type or a bed mounted type power equipment. The maximum torque shall not exceed the torque shown in the detail since possible damage to the foundation could occur. In the case of extremely difficult soils that cause the torque capacity of the installation equipment or the mechanical limit of the foundation to be exceeded, the foundation may be installed at the discretion of the Engineer, in a predrilled hole **that is not larger than six (6) inches in diameter**. When foundation installations are in predrilled holes, minimum torque requirements shall be as recommended by the manufacturer. The installation torque may be measured by torque measuring devices currently available or by calibrating the hydraulic system of the installing equipment.

When steel bases are located in a cut section, the Contractor shall shape the backslope around the steel base with a maximum 25 mm (1 inch) base projection on the exposed side. When steel bases are located in a fill section, the Contractor shall mound the foundation excavation to maintain a 25 mm (1 inch) maximum base projection on the exposed side. The Light Base, Design Steel shall be installed with the cableway entrances 90 degrees from the roadway.

H. Service Equipment

The Contractor shall furnish and install service equipment that consists of a meter socket, required mounting brackets, conduit fittings, required wiring, and other items incidental to a complete meter socket installation. The meter socket shall be in accordance with Mn/DOT 3837. Meter will be furnished and installed by others.

The meter socket shall be suitable for single phase 3-wire 240/480 volt AC, shall contain a positive bypass mechanism, shall have lugs that will allow the power conductors to be stripped and laid into the lugs without being cut, and shall be approved by the power company.

I. Blank

J. Electrical Service

The Contractor shall coordinate the installation of Electrical Service, provide power to the service cabinets, and verify the actual work to be done and all associated costs.

Proposed source of power is identified in the Plan.

Fees for the "Application for Electrical Service" and payment to the Utility Company for providing the electrical service connections shall be the responsibility of the Contractor.

The Contractor shall secure approval from the Engineer for any changes to the Electrical Service as reflected in the Plan.

No measurement will be made of the various items that constitute Electrical Service, however all such work will be construed to be included as part of the project (**the electrical service costs will not be paid for as part of the pay item)**. The Contractor shall provide the Engineer a copy of the invoice from the power company. Payment will be made for the invoice cost paid to the power company plus 10%. The payment shall be compensation in full for all costs incidental thereto, including, but not limited to providing power to service cabinets, power company fees, Power Utility Company Coordination, notifying Blue Earth County of ownership details, and all materials and labor necessary to construct the Electrical Service.

K. Electric Service Information Form

The contractor shall fill out the following electric service information form for lighting systems.

The Contractor shall provide, to the Engineer prior to final acceptance of the project, three (3) copies of the electric service information form for lighting systems and the copies shall be distributed, by the Engineer, as follows:

1. Mn/DOT Central Electrical Services Unit (Non-Metro Projects Only)
2. County of Blue Earth
3. City of Mankato

The Contractor furnished "electrical service information form for lighting systems" shall be considered incidental work.

Electric Service Information Form For Lighting Systems

Project Number: Contractor:

Date:

System	MN/DOT Feed Point Number	Meter Address	Electric Utility Transformer Size In KVA	Length of conductors in feet from transformer connection to meter socket connection.		
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =
				L1 =	L2 =	Neutral =

L. Painting

Painting shall be in accordance with the provisions of Mn/DOT 2545.3M, except that steel lighting service cabinet finish coats, unless specified as otherwise, shall have two field coats of dark green conforming to Mn/DOT 3532.

Light poles shall be unpainted.

M. Anti-Seize Lubricant

Threaded portions of all anchor rods above concrete foundations and steel bases shall be coated with a brush-on anti-seize lubricant before installation of lighting units, lighting service cabinets, or other type cabinets on anchor rods.
The Contractor shall also apply brush-on anti-seize lubricant to the access door nut and bolt of each lighting unit.

N. Luminaires & Lamp Labeling

Luminaires and Lamps shall be marked according to 3810.2A. The term permanent marker shall be modified as follows "black oil based paint marker"

O. Blank

P. Bonding and Grounding

All bonding and grounding shall be in accordance with the provisions of Mn/DOT 2545.3R and as follows:

1. All required ground rod electrodes shall be NRTL Listed.

2. The copper shield for each cable assembly in each pole base shall be drilled with a 5/16 drill and placed on the grounding stud provided in the pole base.

3. The Re-usable screw type active clamping ground lug with a tang shall be placed on top of the sheilding.

4. Bonding of the #6 AWG solid bare grounding conductor to the pole base 5/16" grounding stud shall be accomplished by use of a UL listed Re-usable screw type active clamping ground lug with a tang that connects to the 5/16" pole base grounding stud.

5. The entire assembly (copper sheild and the grounding lug) shall be tightened to from an electrically bonded and grounded connection.

6. Shall apply an oxide inhibiting agent to the connection after final connection and

assembly.

Q. Oxide Inhibitor

The Contractor shall apply an oxide inhibiting agent to all No. 6 grounding connections after assembly and final connection.

SL-3.4 MEASUREMENTS AND PAYMENTS

Furnishing labor, equipment, and materials for construction as specified herein, all to provide one complete operating lighting system at the intersection of C.S.A.H. 60 and C.S.A.H. 82 in accordance with these Special Provisions, the applicable provisions of Mn/DOT 2471, Mn/DOT 2545, current edition of the National Electric Code, the Plans, will be measured as an integral unit complete in place and will be paid for under pay Item No. 2545.601 (LIGHTING SYSTEM) at the Contract price LUMP SUM, which price shall be compensation in full.

2571 PLANT INSTALLATION AND ESTABLISHMENT

2571.1 DESCRIPTION

This work consists of providing, planting, and establishing trees, shrubs, vines, and perennials of the species, variety, grade, size, or age, and root category specified for the locations shown on the plans, including planting or transplanting plants provided by the Department.

Perform this work in accordance with the current edition of the Inspection and Contract Administration Manual for Mn/DOT Landscape Projects (ICAMMLP).

2571.2 MATERIALS

A Nursery Plant Stock 3861

Provide plants of the species shown on the plans in the variety, grade, and size, or age indicated.

A.1 Investigations and Supply of Planting Stock and Materials

By submitting a proposal and accepting award of the contract in accordance with 1205, "Examination of Plans, Specifications, Special Provisions and Site of Work," the Contractor assures familiarity with the project site and contract documents, commitments from suppliers, and delivery of the plant stock and materials required to complete the contract.

A.2 Plant Stock and Materials Documentation

Provide the following plant stock and materials documentation:

(1) At or before the preconstruction conference, provide the Engineer with a Mn/DOT-preliminary *Certificate of Compliance for Plant Stock, Landscape Materials, and Equipment* (copy of form provided in the current edition of ICAMMLP).

(2) At least one week before plant stock delivery to the project, provide the Engineer with the following:

- (2.1) A copy of a valid nursery stock, dealer or grower certificate, registered with the Minnesota Department of Agriculture (MDA), a current nursery certificate or license from a state or provincial Department of Agriculture for each plant stock supplier, or both;
- (2.2) A copy of the most recent *Certificate of Nursery Inspection* for each plant stock supplier;
- (2.3) Documentation certifying that plant material shipped from out-of-state nursery vendors subject to state and federal quarantines, is free of currently regulated pests, including Emerald Ash Borers, and Gypsy Moths. To determine if Minnesota vendors are subject to quarantines, call the MDA Supervisor of Nursery Inspection and Export Certification at (651) 201-6388; and
- (2.4) An updated *Certificate of Compliance*, signed by the Contractor's authorized representative.

(3) Upon delivery of plant stock and materials to the project, provide the Engineer with the following:

- (3.1) Bills of lading or shipping documents for plant stock and landscape materials delivered to the project, and
- (3.2) An updated and signed *Certificate of Compliance*, if necessary, to reflect deviations from the original *Certificate of Compliance* documentation submitted at or before the preconstruction conference.

(4) As a condition for authorization of payments, provide the Engineer with vendor invoices or billing statements for plant stock and materials used on the project.

The Engineer will consider work performed with plant stock, materials, or equipment that was misrepresented in the documentation, as unauthorized work.

If the Contractor does not provide the documentation required by this section, the Engineer may consider subsequent work unauthorized and the Department may assess a daily charge of $200.00, on a calendar day basis, until the Contractor achieves compliance.

A.3 Substitutions

The Engineer may allow substitutions in accordance with 1605, "Substitute Materials." Before requesting substitutions, provide written documentation that plants shown on the plans are not available in quantities to fulfill the contract requirements from the individual suppliers on the *Partial List of Nursery Dealers and Growers* in the most current edition of the ICAMMLP. The Engineer, in consultation with the project designer, may authorize specific substitute plants or may extend the contract time to ensure availability of the plants shown on the plans. Provide substitutions equal to or better than the initially specified materials.

B Department Furnished Stock and Transplant Stock

Obtain Department provided stock and transplant stock from sources shown on the plans or specified by the special provisions.

C Incidental Materials and Work

The Department considers incidental materials and work, specified, non-specified, replacement, or miscellaneous, to include materials and work that are incidental to payment for the individual plant installation contract items and for which the Department does not make direct payment.

C.1 Specified Incidental Materials and Work

Supply, install, and maintain incidental materials as required for plant installation and establishment in accordance with the special provisions, plans, and standard planting details.

C.2 Non-specified Incidental Materials and Work

Supply, install, and maintain non-specified incidental materials for plant installation and establishment success in accordance with product labeling, manufacturer's instructions, and applicable laws, regulations and ordinances.

C.3 Replacement Materials and Work

Provide materials and work to replace unacceptable or missing plants, materials, and incidental items in accordance with the special provisions, plans, and standard planting details. Provide replacement materials and work that is equal to or better than the initially specified materials and work.

C.4 Miscellaneous Incidental Materials, Equipment and Work

Miscellaneous incidental materials, equipment, and work include the following:

(1) Mobilization,
(2) Traffic control,
(3) Protection and restoration of vegetation and property,
(4) Layout and staking,
(5) Soil cultivation,
(6) Compost,
(7) Mulch,
(8) Rodent protection,

(9) Staking and guying,
(10) Seedling shelters,
(11) Temporary erosion control,
(12) Mowing,
(13) Application of herbicides, insecticides, fungicides, and water and
(14) Other materials, equipment, and work necessary to install, maintain, and establish plants as shown on the plans and in a healthy, vigorous, and weed-free condition.

2571.3 CONSTRUCTION REQUIREMENTS

A General

A.1 Landscape Specialist

Provide a Landscape Specialist, certified by the Department, to perform or supervise plant installation and establishment work. Provide documentation of the Certified Landscape Specialist at or before the preconstruction conference. Landscape specialists may obtain certification by completing the one-day Department Landscape Project Inspection and Administration Training Class and passing a test administered by the Department's Landscape Architecture and Forestry Units. Full certification is valid for 3 years. Landscape Specialists may obtain provisional certification for 1 year by passing a test without completing the training class.

A.2 Notices by Contractor

Notify the Engineer at least 3 calendar days before planned deliveries of initial and replacement planting stock to the project to allow for inspection scheduling. Notify the Engineer at least 24 hours before beginning or changing distinct operations. Include the following in the notice:

(1) The project number,
(2) Engineer's name,
(3) Notification date,
(4) Intended dates and times for the operations, and
(5) The planned locations of work.

Provide notifications in writing, using confirmable e-mail, or facsimile transmissions.

A.3 Unauthorized Work and Penalties for Non-compliant Operations

The Engineer will consider work performed as follows to be unauthorized work:

(1) Without required and acceptable documentation and notifications,
(2) Without supervision by a certified landscape specialist,
(3) Without conducting required and acceptable competency tests, or
(4) In conflict with the working hours of 1803, "Prosecution of Work."

In the case of non-compliant operations, the Department may assess a daily charge of $200.00, on a calendar day basis, until the Contractor achieves compliance.

A.4 Required Equipment

Provide equipment meeting the requirements of 1805, "Methods and Equipment," and with the following available on the project at all times:

(1) At least one portable compaction tester capable of measuring compaction in the soil to at least 18 in [450 mm] deep,
(2) At least one soil recovery probe for assessment of soil moisture conditions, and
At least one tree caliper with measurement readings in inches.

B Preconstruction Work

Preconstruction work includes:

(1) Attending a preconstruction conference,
(2) Submitting preconstruction documentation,
(3) Mobilizing equipment and supplies to the project,
(4) Protecting existing vegetation, resources, and property in accordance with the plans, special provisions, and 1712, "Protection and Restoration of Property," 2031, "Field Office and Laboratory," 2557, "Fencing," and 2572, "Protection and Restoration of Vegetation."

C Staking Planting Holes and Beds

Stake the exact locations and layouts for the Engineer's approval.

To remedy unanticipated, localized problems and seasonal conditions that may hinder plant establishment, the Contractor may request the Engineer's approval to perform the following in accordance with the standard planting details and options shown on the plans:

(1) Relocate plantings,
(2) Make plant substitutions, or
(3) Modify soil or drainage characteristics.

Locate plantings to provide the following:

(1) A clear sight distance of at least 1,200 ft [360 m] in front of traffic signs and extending 50 ft [15 m] beyond the signs; and
(2) Clear zones and safety sight corners and lines shown on the plans free of plants.

D Preparing Planting Holes and Planting Beds

To prevent site compaction and damage, do not work in planting holes and bed areas if the soil moisture is greater than field capacity.

D.1 Utilities

Before cultivating soil or excavating holes on the project, meet the requirements of 1507, "Utility Property and Service."

The Contractor may request the Engineer's approval to relocate plantings to avoid unanticipated conflicts with utilities.

D.2 Weed Control and Soil Cultivation

Apply herbicide to actively growing vegetation beginning in spring or fall. Before cultivating individual planting holes and bed areas, kill turf and weed growth within the limits of planting areas that will receive mulch in accordance with the following:

(1) Mow existing vegetation to at least 3 in [75 mm] at least one week before spraying herbicide. Remove the cuttings. Allow the vegetation to re-grow to a height from 4 in to 8 in [100 mm to 200 mm] before applying the herbicide.
(2) At least three days before applying herbicide, submit to the Engineer, labels of the intended herbicides and a copy of a valid MN Pesticide Applicator License, including Category A and Category J.

(3) Spray and kill turf and weeds, including the top growth and roots, only within designated areas using a non-selective, non-residual post emergent herbicide containing 41 percent glyphosate as the active ingredient. Ensure personnel, licensed by the MDA and experienced in the use of chemical pesticides perform the work in accordance with the manufacturer's instructions and recommendations. Apply the herbicide to dry foliage on actively growing vegetation. Apply the herbicide in August or early September before the fall or spring Plant Installation Period (PIP) as required by the contract. If an August or September application is not possible for the spring PIP, apply the herbicide in late April or early May. If precipitation occurs within 6 hours after applying herbicide, reapply herbicide as needed to achieve 100 percent kill.

(4) Before beginning soil cultivation work, schedule and perform a Competency Test to the satisfaction of the Engineer. The Engineer considers a satisfactory Competency Test one that demonstrates acceptable soil cultivation, incorporation of soil additives, compaction levels, and soil drainage in one planting bed area and one individual tree planting area.

(5) Before placing soil additives as shown on the plans, use a spading machine to deep cultivate the planting hole and bed areas by loosening the soil to at least 12 in [300 mm] deep and a compaction level of no more than 200 psi [1,400 kPa] to this depth, as measured from the finished grade elevation of the soil. The Engineer may approve other equipment to address site constraints, if requested by the Contractor. For hydraulic spade-type, machine-moved tree-transplanting, the Engineer will not require planting hole cultivation, other than loosening the soil outside the soil-ball perimeter in accordance with the standard planting details shown on the plans.

(6) Unless otherwise shown on the plans, add 4 in [100 mm] of Grade 2 compost, in accordance with 3890, "Compost" and other soil additives shown on the plans or as requested by the Contractor and approved by the Engineer, over the cultivated planting hole and bed areas and use a spading machine to incorporate it to a depth of at least 12 in [300 mm], as measured from the finished grade elevation of the soil.

(7) Use a compaction tester to ensure compaction in the planting hole and bed areas does not exceed 200 psi [1,400 kPa] to a depth of at least 16 in [400 mm]. If Contractor-operations result in zones of hardpan or excessively compacted soil, repeat deep cultivation or de-compact the subsoil in accordance with 2105.3.G.2, "Compaction Testing and the Grading and Base Manual " specifically the requirements for turf establishment areas, at no additional cost to the Department.

(8) Ensure drainage in the planting hole and bed areas. For suspected drainage problems, perform a percolation test by filling a 16 in [400 mm] deep planting hole with water and measuring the time it takes the water to drain from the hole. The Engineer considers adequate drainage equal to or greater than a percolation rate of ½ in/h [12 mm/h]. If drainage does not meet these requirements, request approval from the Engineer to relocate or delete affected planting locations or proceed with Extra Work using one or a combination of the planting details for poorly drained soils, as shown on the plans.

(9) Apply temporary erosion control measures in accordance with the NPDES permit, SWPPP notes, and 2573, "Storm Water Management." The Contractor may use Type 6 wood chip mulch at a depth no more than 1 in [25 mm] for temporary erosion control in prepared planting bed areas.

D.3 Wet Soils, Rock, and Debris

If the Contractor encounters excessively wet soils, bedrock, or excessive quantities of boulders and construction debris, the Contractor may request the Engineer's approval to relocate or delete plantings, or modify soil or drainage characteristics in accordance with the alternative options in the standard planting details shown on the plans.

E Delivery and Storage of Plants

Before installation, the Engineer will provide for inspection and acceptance of plant stock delivered to the project in accordance with the current edition of the ICAMMLP and 3861, "Plant Stock."

Install plant stock on the day of delivery to the project unless using temporary storage methods. Before installation, keep the roots of plants completely covered with a moisture-holding material consisting of wood chips, straw, sawdust, moss, or soil. Keep the moisture-holding material continuously moist and protect it from drying

winds, direct sunlight, excessive heat, freezing, low humidity, inadequate ventilation, and animal or human harm. The Engineer will consider plants with damage that occurred or was discovered during temporary storage, unacceptable. Do not store plants from one planting season to the next.

E.1 Pruning — Top Growth and Roots

Immediately before planting, prune the roots of bare-root plants, except seedlings, and the top growth of deciduous plants. Cut-back broken or badly bruised roots and dry root tips to sound, healthy tissue. Prune to remove dead, rubbing, damaged, diseased, and suckering branches, and to improve plant symmetry, structure, and vigor. Prune coniferous trees and shrubs only to remove damaged growth or a competing leader.

Prune in accordance with the horticultural practices specified in the current edition of the ICAMMLP and the standard planting details on the plans.

Do not prune oak trees during the oak wilt season from April through July, to prevent the spread of oak wilt disease. Immediately treat accidental cuts or wounds to oaks with a wound dressing in accordance with the standard planting details shown on the plans. Keep wound-dressing material on the project during the oak wilt season.

E.2 Buried Root Flares

The Engineer will consider container-grown and balled and burlapped plant stock unacceptable if provided with more than 4 in [100 mm] of soil depth above the root flare. The Engineer may accept plants provided with no more than 4 in [100 mm] excess soil above the root flare if the excess soil can be removed without damaging the root system of the plants.

E.3 Excessive Roots

Reject containerized or balled and burlapped plants with roots extending at least 4 in [100 mm] beyond the container or burlap.

F Installation of Plants

F1 General

Before proceeding with plant installation work, schedule and perform a competency test demonstrating acceptable plant installation methods to the Engineer's satisfaction and in accordance with the plans and standard planting details, for each plant pay item and root category on the project. The Engineer considers a satisfactory competency test to be one that demonstrates acceptable handling of plants, digging of holes and beds, and installation of plants, initial watering, installation of protection materials and mulching.

Before digging planting holes, rake temporary erosion control wood chip mulch off prepared planting areas to prevent wood chip contamination of the planting soil in the holes.

The Contractor may re-spread wood chip mulch formerly used as temporary erosion control around plants to a depth no greater than 1 in [25 mm] following plant installation, if newly provided and acceptable Type 6 mulch is applied over the top to the depth shown on the standard planting details in the plans.

Dig planting holes to the configuration and minimum dimensions shown in the standard planting details on the plans. If the soil moisture is greater than field capacity, do not work in planting holes and beds.

Ensure drainage in the planting hole and bed areas. For a suspected drainage problem, perform a percolation test by filling a 16 in [400 mm] deep planting hole with water and measuring the time it takes the water to drain from the hole. The Engineer considers adequate drainage equal to or greater than a percolation rate of ½ in/h [12 mm/h]. If drainage does not meet these requirements, request approval from the Engineer to relocate or delete affected planting locations or proceed with extra work using one or a combination of the planting details for poorly drained soils as shown on the plans.

F.2 Individual Plant Stock Types and Installation Requirements

Install plants in accordance with the steps and requirements in the standard planting details shown on the plans and specific to each plant stock type.

G Watering

During the PIP, provide watering equipment and forces on the project capable of completely watering plants as often as necessary to maintain soil moisture in the root zones.

Within 2 hours of installation, saturate the backfill soil of each plant with water. After settling, provide additional backfill to fill in the voids.

H Mulch

Before placing mulch, fine grade and level the planting bed soils with hand tools. Place mulch material in accordance with the standard planting detail shown on the plans no more than seven days after plant installation. The Engineer will consider placement of mulch, contaminated with soil or other materials and not complying with the requirements of 3882, "Mulch Materials," unacceptable. Remove unacceptable mulch from the project.

I Protection of Installed Trees

Use protective materials to ensure the healthy growth and survival of installed trees.

I.1 Staking and Guying

Unless staking and guying is shown on the plans, only stake and guy trees if necessary to maintain the trees in a plumb condition. The following circumstances may warrant staking and guying:

(1) Excessive soil moisture,
(2) Light-textured soil,
(3) Steep slopes,
(4) Exposure to excessive wind, and
(5) The likelihood of vandalism.

Install staking and guying in accordance with the standard planting details shown on the plans.

Remove staking and guying within 1 year of initial installation.

I.2 Rodent Protection

Place rodent protection around deciduous, pine, and larch trees in accordance with the standard planting details shown on the plans.

I.3 Tree Painting

Paint trees in accordance with the standard planting details shown on the plans.

I.4 Seedling Tree Shelters

Install seedling tree shelters in accordance with the standard planting details shown on the plans.

J Cleanup and Restoration Work

Perform the following cleanup and restoration work on an ongoing basis and as the final step of the initial planting operations:

(1) Remove excess materials, rocks and debris from the project;
(2) Repair turf in disturbed areas with seed mixes as shown on the plans or to match in-place turf;
  (2.1) Immediately before sowing seed or laying sod, prepare soil as specified in 2575.3.B, "Grading Preparations Prior to Seeding;"
  (2.2) Uniformly broadcast a Type 4 natural base fertilizer, as specified by 3881.2.B.4, "Type 4 — Natural Based Fertilizer," that provides nitrogen at an application rate of 43 lb/acre;
  (2.3) Lay sod, or uniformly broadcast seed at 1.5 times the rate specified in Table 2575-1, "Seed Mixture Application Rates." Provide seed in accordance with the requirements of 3876, "Seed" and perform seeding in accordance with Table 2575-2, "Season of Planting;"
  (2.4) Rake and firm seeded areas to ensure seed contact with the soil;
  (2.5) Broadcast or disc anchor Type 1 mulch in all seeded areas;
(3) Install erosion control measures to prevent erosion.

K Plant Establishment Period

K.1 Establishment Period

A Plant Establishment Period (PEP) of at least 2 calendar years begins on the date that initial planting operations on the project are completed and continues until final acceptance of the project, unless otherwise shown on the plans.

K.2 Establishment Work

Keep plants in a healthy growing condition in accordance with the current edition of the ICAMMLP throughout the establishment period and submit Mn/DOT *Landscape Contractor Scouting Reports* in accordance with item 1 of 2571.3.K.2.a, "All Plants." Perform plant establishment work throughout the growing seasons from April through October and as necessary during the dormant seasons from November through March. The Engineer may perform random inspections throughout the PEP to verify compliance. The Engineer will consider the Contractor non-compliant if the Contractor does not maintain plants throughout the PEP and does not submit scouting reports.

The Department may assess a daily charge of $200.00 for non-compliance, on a calendar day basis, until the Contractor achieves compliance.

K.2.a All Plants

In plant establishment work, perform the following:

(1) Scout to assess the condition of the plants and the planting site and factors that may influence plant health, vigor, and establishment success. Scout these conditions at least every two weeks during the growing season and at least every month during the dormant season;
(2) Submit a written scouting report to the Engineer via e-mail by the 1st and 15th of each month during the growing season from April to October and by the 1st of each month during the dormant season from November to March. The Engineer will use the report-frequency and content to assess plant establishment compliance. The report may include scanned copies of the plan sheets with the Contractor notes, copies of the report form found in the current edition of the ICAMMLP, or both. Include the following in the report:
  (2.1) The project number;
  (2.2) Engineer's name;
  (2.3) Name of Contractor's responsible scout or representative;

(2.4) Dates work was performed;
(2.5) Work locations;
(2.6) Work completed;
(2.7) Prevailing weather conditions;
(2.8) Soil moisture assessments;
(2.9) Insect, animal, vehicular, weather, or other damage;
(2.10) Disease problems;
(2.11) Treatment recommendations' and
(2.12) Assessment of overall plant conditions including weed competition and control.

(3) Maintain soil moisture in accordance with 2571.3.G, "Watering" and the watering guidelines of the standard planting details shown on the plans;

(4) Repair, adjust, or replace staking and guying, mulch material, planting soil, rodent protection, seedling tree shelters, tree paint, and other incidental items in accordance with the plans;

(5) Maintain healthy, vigorous plants. free of harmful insects, fungus, and disease;

(6) Remove dead, dying, and unsightly plants. Provide and install replacement plants in accordance with 2571.2.K.2.b, "Replacement Requirements;"

(7) Maintain plants in a plumb condition at the planting depth shown on the planting details in the plans;

(8) Maintain planting areas in a weed-free condition as follows:

(8.1) Remove weeds, top growth and roots, within the mulch limits by hand pulling. Pre-water mulched areas to ensure weed top growth and roots are entirely removed. Ensure weeding operations do not contaminate the mulch or project with weed seed, weed-laden soil or propagating weed parts. Remove State and County-regulated noxious weeds to at least 3 ft [900 mm] beyond the mulch limits. Remove weed parts or weed-laden material from the project to avoid the spread of weed infestations;

(8.2) Do not spray chemicals for weed control in mulched planting areas during the PEP. The Contractor may apply a non-selective, non-residual post-emergent herbicide containing 41 percent glyphosate, as the active ingredient with a surfactant on a spot treatment basis with a brush or wick applicator. The Contractor may also apply a broad-spectrum dichlobenil based granular, pre-emergent herbicide in accordance with product labeling and manufacturer's recommendations;

(8.3) Do not weed whip or weed clip as weed control;

(8.4) Mow turf bands around the mulch limits at least 3 ft [900 mm] beyond the limits and at least 4 in [100 mm] high if the turf height exceeds 9 in [230 mm] adjacent to mulched planting areas;

(8.5) Mow turf areas installed as part of the project when the growth exceeds 18 in [500 mm] high. Mow turf from 6 in [150 mm] to 12 in [300 mm] high. Control State and County-listed noxious weeds;

(9) Prune to remove dead, rubbing, damaged or diseased branches, unwanted suckers, and to improve plant form and structure;

(10) Prevent or repair rutting and other damage that may lead to soil erosion and weed infestation;

(11) Perform plant establishment operations consistent with plant care and horticultural practices detailed in the current edition of the ICAMMLP; and

(12) Remove excess material, obsolete temporary erosion control devices, rocks, and debris from the project.

K.2.b Replacement Requirements

Within the first year of the 2-year PEP, determine which plants need replacing. Replace dead, defective, or missing plants and incidental materials in accordance with initial installation requirements, including plants lost due to accidents, vandalism, theft, rodent damage, damage caused by the Contractor, or if ordered by the Engineer, at no additional cost to the Department. Conduct plant replacement operations during the month of May within the first year of the PEP. At least one week before plant replacement, submit a summary report of proposed plant replacements to the Engineer. Include by attachment, copies of plan sheets with the proposed replacement quantities and locations identified and a Mn/DOT *Certificate of Compliance for Plant Stock, Landscape Material, and Equipment*, in the report. Using brightly colored paint, mark on site plants requiring replacement.

Provide replacement plants and incidental materials that are equal to or better than the initial material required by the contract.

If less than a full year remains in the PEP, do not replace plants unless the PEP is extended by a supplemental agreement or change order to provide at least one full year of establishment care.

L Acceptance of Work

For acceptance at full payment, ensure each plant meets the *Criteria For Accepting Plant Size* shown in the current edition of the ICAMMLP.

L.1 Acceptance of Preconstruction Work

The Engineer will accept the preconstruction work after the Contractor secures commitments for required materials, submits a Mn/DOT *Certificate of Compliance for Plant Stock, Landscape Materials, and Equipment*, participates in a preconstruction conference, obtains the Engineer's approval for the progress schedule, moves equipment and supplies to the project, and provides protection for existing plants.

L.2 Acceptance of Preparation of Planting Holes and Beds

For the Engineer's acceptance of preparation of planting holes and beds, complete a competency test, other specified staking, initial weed control, soil cultivation including incorporation of additives, and temporary erosion control work.

L.3 Acceptance of Initial Planting Operation

The Engineer will provisionally accept initial planting operations based on the following:

(1) Plant stock acceptance,
(2) Completion of a competency test,
(3) Installation of individual plants, and
(4) All incidental material and work items shown in the initial planting operations chapter of the current edition of the ICAMMLP, including initial but not limited to watering, tree protection materials, mulching, proper drainage, pruning, staking and guying, tree painting, fertilizing, erosion control, seeding and clean up.

L.4 Final Acceptance

As a condition for terminating the PEP and conducting the final inspection, the Engineer may require the Contractor to bring the plant establishment work into compliance.

On or about the date of termination of the PEP, the Engineer will perform a final inspection of the project.

The Engineer will determine which plants to accept for payment at the contract unit price, at a reduced payment, or with no payment.

Upon final acceptance, the Engineer will not require further Contractor-care of plantings.

The Engineer will make final acceptance at the completion of the two-year PEP and based on a final inspection of the completed project.

2571.4 METHOD OF MEASUREMENT

The Engineer will measure plants separately by the number of acceptable plants for each contract item in accordance with 2571.5.G, "Payment Schedule."

2571.5 BASIS OF PAYMENT

The Department will make payment for plant installation and establishment at a percentage of the contract unit price per item unit of measure for all costs relating to furnishing, installing, and maintaining, the required plants and associated incidental materials as specified and shown on the plans.

The Engineer may require additional materials and work beyond that specified or shown in the contract. The Department will make payment for the additional materials and work as extra work.

The Department may make full payment, reduced payment or no payment of no more than the maximum eligible partial payment percentage at any payment phase (initial, interim, final) based on the performance of the Contractor (see Payment Checklist in the current edition of the ICAMMLP).

A Full Payment

The Department will make full payment of 100 percent of the contract unit price for each plant the Engineer considers acceptable, upon inspection, if the Contractor fully achieves all Payment Criteria as defined in the Payment Checklist in the current edition of the ICAMMLP.

B Reduced or No Payments

The Department will make a reduced payment or no payment of the contract unit prices for each plant if the Contractor does not achieve all Payment Criteria, as defined in the Payment Checklist in the current edition of the ICAMMLP.

C Initial Payment

The Department will make partial payment up to 70 percent of the contract unit price for each plant for completion of the following work:

C.1 Preconstruction Work

The Department will pay no more than 10 percent of the contract unit price for each plant with the completion and acceptance of preconstruction work as defined in the *Preconstruction Work Checklist* in the current edition of the ICAMMLP.

C.2 Preparation of Planting Holes and Beds

The Department will pay no more than 15 percent of the contract unit price for each plant with the completion and acceptance of preparation of planting holes and beds work as defined in the *Preparation of Planting Holes and Beds Checklist* in the current edition of the ICAMMLP.

C.3 Initial Planting Operations

The Department will pay no more than 45 percent of the contract unit price for each plant with the completion and acceptance of initial planting operations work as defined in the *Initial Planting Operations Checklist* in the current edition of the ICAMMLP.

D Interim Payment

At the end of the first calendar year of the PEP, and after completion and acceptance of the Contractor's work and continuous compliance with the plant establishment requirements as defined by the *Plant Establishment-Year One Checklist* in the current edition of the ICAMMLP, the Engineer may authorize no more than 15 percent of the contract unit price for each plant.

E Final Payment

The Department will make final payment after final inspection and acceptance of the completed project at the end of the PEP. The Engineer may authorize no more than 15 percent of the contract unit price for each plant as defined by the *Plant Establishment Year 2 Checklist* in the current edition of the ICAMMLP. The total final payment includes the Plant Establishment Year 2 payment, assessments and reduced payments, if any, and bonus payment, if eligible.

The Department will not pay for replacement plants, unless authorized by the Engineer.

The Department may continue to withhold any percentage of initial and interim payments from the final payment.

The Department will not reimburse any assessments charged during the contract period at the final payment. If the final voucher shows that the total of initial and interim payments made exceeds the total amount due the Contractor, promptly refund the Department for the overpayment.

F Bonus Payment

When 90 percent or more of all plants installed within the initial plant installation period (PIP) and related contract operations have been continuously acceptable throughout the contract period, the Department will make a bonus payment of 10 percent of the total final contract unit price for plant installation and establishment.

The Department considers replacement plants, replaced during the initial PIP, to be initially installed plants. Replacement plants made during the PEP are not eligible for bonuses.

G Payment Schedule

The Department will pay for plant installation and establishment on the basis of the following schedule:

Item No.	Item	Unit
2571.501	Coniferous tree (size & root category)	tree
2571.502	Deciduous tree (size & root category)	tree
2571.503	Ornamental tree (size & root category)	tree
2571.504	Coniferous shrub (size & root category)	shrub
2571.505	Deciduous shrub (size & root category)	shrub
2571.506	Vine (age or size & root category)	vine
2571.507	Perennial (age or size & root category)	plant
2571.541	Transplant tree (spade size*)	tree
2571.544	Transplant shrub	shrub
2571.546	Transplant vine	vine
2571.547	Transplant perennial	plant

NOTE: State Root Category: Seedling, Bare Root, Machine Moved, Container Grown, Balled and Burlapped

* Spade size: 42 in [1.1 m], 60 in [1.5 m], 78 in [1.9 m], 85 in [2.1 m], 90 in [2.3 m].

March 28, 2001
Supercedes January 4, 1993

SPECIFICATION – NO. 3
HIGH DURABILITY PREFORMED PAVEMENT MARKINGS
(Including Stop Lines and Crosswalks)

1.0 DESCRIPTION

The work shall consist of furnishing and installing retroreflective preformed polymer pavement markings for lane, center line and edge line longitudinal striping, work messages, symbols and particularly, stop lines and crosswalks. The marking may be applied to hot or ambient temperature bituminous surfaces and to properly prepared concrete surfaces. Work shall be accomplished in accordance with this provision and in reasonably close conformance to the dimension and lines shown on the Plans or established by the Engineer.

2.0 MATERIALS AND COMPONENT REQUIREMENTS

2.1. GENERAL

High durability preformed markings shall consist of white or yellow films with a urethane topcoat and glass beads distributed throughout to provide immediate and continuing retroreflection. Ceramic particles shall be bonded to the top urethane layer to provide a skid resistance surface. The edges of the preformed tape rolls shall be clean-cut and true.

Preformed works, symbols, stop lines and crosswalks shall conform to shapes and sizes as outlined in the "Minnesota Manual on Uniform Traffic Control Devices," dated 1991, or as modified.

All materials shall be of the highest quality as the markings will be subjected to severe wear conditions such as repeated shear actions from crossover or encroachment traffic or traffic turning stopping and starting.

2.2. REQUIREMENTS

2.2.1. Glass Beads – The size, quality and refractive index of the glass beads shall be such that the performance requirements for the markings shall be met. Bead adhesion shall be such that beads are not easily removed when the material surface is scratched with a thumbnail.

2.2.2. Glass Bead Retention – The film shall have glass bead retention qualities such that when a 2" x 6" (5.08cm x 15.24 cm) sample is bent over a ½" diameter mandrel, with the 2" dimension perpendicular to the mandrel axis, microscopic examination of the area on the mandrel shall show no more than 10% of the beads with entrapment by the binder of less than 40%.

2.2.3. Initial Reflectance – Pavement markings shall have the following initial minimum reflectance values as measured in accordance with ASTM D 4061. The photometric quantity to be measured shall be specific luminance (SL), and shall be expressed as millicandelas per square foot per footcandle [mcd ft^{-2} fc^{-1}]. The metric equivalent shall be expressed as millicandelas per square meter per lux. The test distance shall be 50 ft. (15m) and the sample size shall be a 2.0 x 2.5 ft. rectangle (0.61m x 0.76m).

		White			Yellow	
Entrance Angle	86.0	86.0	86.5	86.0	86.0	86.5
Observation Angle	0.2'	0.5'	1.0'	0.2'	0.5'	1.0'
Specific Luminance SL [mcd ft^{-2} fc^{-1}].	700	500	400	500	350	300

2.2.4. Reflectivity Retention – To have a good, effective performance life, the glass beads must be strongly bonded and not be easily removed by traffic wear.

The following test shall be employed to measure reflectivity retention:

Taber Abraser Simulation Test

Using a Taber Abraser with an H-18 wheel and a 125 gram load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure.

No more than 15% of the beads shall be lost due to pop-out and the predominant mode of failure shall be "wear down" of the beads.

2.2.5. Thickness – The film, without adhesive, shall be a minimum thickness of 0.60"(1.50mm).

2.2.6. Tensile Strength and Elongation –The film shall have a minimum tensile strength of 150 pounds per square inch of cross-section when measured in the direction of the length of roll and tested in accordance with ASTM D 638-76, except that a sample 6" x 1" (15.24cm x 2.54cm) shall be tested at a temperature between 70°F and 80°F using a jaw speed of 10 to 12 inches per minute. The sample shall not exceed an elongation of 50% at beak when tested by this method.

2.2.7. Skid Resistance – The surface of the retroreflective film shall provide an initial average skid resistance value of 55 BPN when tested in accordance with ASTM E 303.

2.2.8. Patchability – The pavement marking film shall be capable of use for patching work areas of the same type of film in accordance with manufacturer's instructions.

2.2.9. Color –The pavement markings shall consist of white and yellow films with pigments selected and blended to conform to standard highway colors. Whate material

shall be no darker or yellower than chip 17778 of Federal Standard 595a. The color yellow shall be reasonable close to color chip 13538 of the Federal Standard No. 595a.

2.2.10. Adhesive – All pavement markings shall be pre-coated pressure sensitive adhesive to bond the tape to the surface of the roadway. The adhesive and other materials shall be compatible with a primer should it be necessary to precondition a pavement surface and is so ordered by the Engineer.

2.2.11. Primer – The manufacturer of the markings shall recommend an appropriate primer when the overlay procedure is specified or becomes a necessary installation procedure.

2.2.12. Shelf Life – The markings shall be suitable for use up to one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

3.0 PERFORMANCE REQUIREMENTS

3.1. Pavement marking tapes, symbols and legends plaed on concrete and bituminous pavements, whether on hot or ambient surface temperatures, shall meet at least the following field performance requirements.

3.2. Adhesion – During the standard warranty granted by the manufacturer following the installation date of markings placed in accordance with the manufacturer's instruction and determined to be an inadequate traffic control device, supply materials shall be provided by the manufacturer for material actually missing from the surface due to loss of adhesion[1] or complete wear-through.

3.3. A minimum retroreflectance level is not offered on these markings.

4.0 CONSTRUCTION REQUIREMENTS

4.1. GENERAL

Marking tape shall be supplied in roll form without a protective liner, unless otherwise specified by the Engineer. Legend and symbols shall be supplied in accordance with the manufacturer's recommendations.

4.2. PRE-INSTALLATION

To assure a quality installation, the Contractor shall provide for the following materials control and services.

[1] Overlay application placed after September 1 are not recommended and are exempt from the adhesion loss performance. Also, inlaid and overlaid materials are exempt if their removal is caused by snow plow equipment.

4.2.1. Certification of Materials Shipped – The manufacturer shall, by notarized letter, certify that the specified products in these provisions were shipped to the Contractor. The letter shall contain the following information:

1. State Project Number/Highway Number/Location
2. Name of Prime Contractor
3. Mn/DOT Specification Number
4. Shipping Date
5. Product Names/Numbers/Quantities
6. Notary Seal

The notarized letter must be presented to the Engineer at least fifteen (15) calendar days prior to installing the materials on the project.

4.2.2. Training of a Striping Contractor – The Contractor shall secure and cause application training seminars to enhance the installation of the pavement markings. The training shall address surface preparation and all application requirements and techniques necessary for successful marking tape applications. Upon completion of the seminar for these personnel, the manufacturer of the marking tape shall provide written certification of approval to the Contractor in the following forms:

1. A certificate stating this approval and dated for one year. A copy of this certificate shall be on file with Mn/DOT.

2. Cards stating this approval and dated for one year will be given to each person approved and may be requested by state project personnel.

4.2.3. Equipment and Inlay Application Procedures – There are two types of application procedures, both of which may be required on a single project. The MANUAL and MECANICAL application procedures are not detailed herein but may be obtained from the Office of Traffic, Safety & Operations (651) 234-7373.

4.3. INSTALLATION CONTROLS AND DETAILS

4.3.1. Marking tapes, legends and symbols shall be applied in accordance with the details shown in the Special Provisions, Plans, this Specificaiton and control points established by the Engineer.

4.3.2. Work Restrictions – Application of marking materials during hours of darkness will only be allowed by approval of the Engineer. On pavement open to traffic, the work may be suspended by direction of the Engineer during peak traffic hours or at any other time traffic is being unduly hampered or delayed by the work in progress. Other restricting will be determined by provisions governing paving operations.

4.3.3. Alignment, Dimensions and Tolerances

A. The Engineer will place necessary "spotting" at appropriate points to provide horizontal control for striping and determine necessary starting and cut-off points. Skip line intervals will not be marked. Longitudinal joints and pavement edges shall serve as horizontal control when so directed.

B. Unless otherwise indicated all pavement striping shall be 4 inches wide. Skip lines shall be applied in lengths of 10 feet separated by gaps of 40 feet. The 50-foot cycle length is to be rigorously controlled and shall be carried through form day to day.

C. A tolerance of 1/8 under and ½ inch over the specified width will be allowed for striping provided the variance is gradual and does not detract from the general appearance. Skip line segments may vary up to ¼ foot from the specified lengths provided the over and under variation are reasonable compensatory. Alignment deviations from the control guide shall not exceed 2 inches. Material shall not be applied over a longitudinal joint. Establishment of application tolerances shall not relieve the Contractor of his responsibility to comply as closely as practicable with the planned dimensions.

4.4. FINAL PRODUCT

The films, when applied according to the recommendations of the manufacturer, shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable. The film shall be weather resistant and, through normal traffic wear, shall show no fading, lifting or shrinking which will significantly impair the intended usage of the marking throughout its useful life and shall show no significant tearing, roll-back or other signs of poor adhesion.

5.0 PAVEMENT MARKING BY OVERLAY PROCEDURE

The Special Provisions or Plans of the Contract will indicate markings that are to be placed using the overlay procedure. Also, the overlay procedure may be necessary when conditions or events occur that prevent the use of the specified inlay procedure.

5.1. OVERLAY PRODEDURE SPECIFIED

Payment for the accepted quantities of pavement markings installed at contract prices per unit of material shall be compensation in full for all costs incurred in furnishing and installing, including surface preparation, use of primers, and traffic control, the materials, all as recommended by the manufacturer and subject to the Engineer's approval.

5.2. INLAY PROCEDURE SPECIFIED NOT USED

5.2.1. Beyond Contractor's Control – When markings specified cannot be inlaid AND the Engineer determines that the Contractor had no control over the causation, the pavement markings shall be installed by the overlay procedure. The Contractor shall install the markings per instruction from the manufacturer and as approved by the Engineer. Surface preparation, including traffic control, shall be paid for under Specification 1904 – EXTRA AND FORCE account work.

5.2.2. If the Engineer determines that the "causation" in Section 5.2.1 was within the Contractor's control, the markings shall be installed by the overlay method, as ordered by the Engineer. Pay items (for inlaying) shall be used and are payment in full for all additional costs incurred, including traffic control.

6.0 ACCEPTANCE

Acceptance of completed work shall be based on daytime and nighttime reviews conducted by the Engineer. The Engineer may order rework based on the day and/or night reviews.

ATTACHMENT
SPECIFICATIONS FOR EPOXY RESIN PAVEMENT MARKINGS
(FREE OF TOXIC HEAVY METALS)

NOTE: Section 10.0 has been revised in the Special Provisions

1.0 DESCRIPTION

The work shall consist of furnishing and installing reflectorized white and yellow two-component, 100 percent solids epoxy pavement markings. Applications are lines, legends, symbols, crosswalks and stop lines placed on properly prepared asphaltic and portland cement concrete pavement surfaces in accordance with the Special Provisions, Plans, this Attachment and as directed by the Engineer. Upon curing, the materials produce pavement markings of specified thickness, width and retroreflectivity that resist wear from high traffic volumes for several years. During darkness and weather permitting, yellow markings shall be readily distinguishable from white markings.

Values stated in the International System of Units SI apply only to projects to be constructed in Metric units of measure. Values stated in inch-pound units (in parenthesis) apply only to projects to be constructed in English units of measure.

2.0 QUALIFICATIONS

2.1 Epoxy striping is a technical process requiring specialized equipment, quality controlled materials and well-trained operators to produce functional, long life pavement markings. To minimize application failures, Mn/DOT requires epoxy materials, beads, the pavement marking contractor, and striper to be approved prior to the bidding process.

2.1.1 A pavement marking contractor and/or equipment may be qualified as follows:

1. No previous epoxy striping on any construction contract-- contact Mn/DOT to arrange for field demonstration.
2. Recent epoxy striping experience with other state transportation departments-- contact Mn/DOT and provide experience summary, including names of persons to be contacted.
3. If striper is new, contact Mn/DOT to arrange for field demonstration.

2.1.2 Before any epoxy product is acceptable for bid, it shall be field tested, evaluated, approved and assigned a product identification number by the Mn/DOT Materials Engineering Section. An approved product is placed on the APPROVED PRODUCTS LIST which is shown in Section 2.1.4.

2.1.3 No change in product identification, chemical composition as indicated by infrared spectrophotometry and/or chemical analysis, or changes in the application requirements will be allowed. Any such changes shall be submitted for further evaluation.

Mn/DOT EPOXY PAVEMENT MARKING MATERIAL
APPROVED PRODUCTS LIST

2.1.4

Fast Dry (Type I)

Manufacturer	Product	Appr Date
Polycarb Inc.	MARK 55.3	1998
Epoplex	LS 50	1998

Slow Dry (Type II)

Manufacturer	Product	Appr Date
Polycarb Inc.	MARK 55	1991
Epoplex	LS 60	1998

3.0 MATERIAL CLASSIFICATIONS

3.1 This specification provides for the classification of epoxy resin pavement marking systems by type.

3.1.1 Type I - A fast cure material suitable for line applications and, under ideal conditions , may not require coning.

3.1.2 Type II - A slow cure material suitable for all applications of pavement markings under controlled traffic conditions, i.e., coning is required and flagging may be as directed by the Engineer.

3.1.2 **Only Slow Dry Type II epoxy material shall be used for epoxy pavement markings** except when specified as otherwise in the Special Provisions.

4.0 EPOXY AND BEAD REQUIREMENTS

4.1 Epoxy Resin Material

4.1.1 The material shall be composed of epoxy resins and pigments only. No solvents are to be given off to the environment upon application to a pavement surface.

4.1.2 The composition shall be within the tolerance permitted for the product tested and approved by Mn/DOT. Type II material shall be completely free of TMPTA (Tri-Methyol Propane Tri-Acrylate) and other multi-functional monomers.

4.1.3 All materials shall be free of lead, cadmium, mercury, hexavalent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency.

4.1.4 Color -- The color of the white epoxy shall be a pure flat white, free of tints. The color of the yellow epoxy shall closely match Color Number 33538 of Federal Standard 595 and shall conform to the following CIE Chromaticity limits using illuminant "C":

x	0.470	0.485	0.520	0.480
y	0.440	0.460	0.450	0.420

Daylight Directional Reflectance (Y), white, minimum	83
Daylight Directional Reflectance (Y), yellow, minimum	50

Testing will be according to :

Daylight Directional Reflectance	ASTM D 2805
Color	ASTM D 2805

4.1.5 Adhesion Capabilities -- When the adhesion of the material to portland cement concrete (the concrete shall have a minimum of 2,070 kPa (300 psi.) tensile strength) is tested according to American Concrete Institute Committee 403 testing procedure, the failure of the system must take place in the concrete. The concrete shall be 32°C when the material is applied, after which the material shall be allowed to cure for 72 hours at 23±2°C.

4.1.6 Abrasion Resistance -- When the abrasion resistance of the material is tested according to ASTM C 501 with a CS-17 wheel under a load of 1000 grams for 1000 cycles, the wear index shall be no greater than 82. (The wear index is the weight in milligrams that is abraded from the sample under the test conditions).

4.1.7 Hardness -- The Type D durometer hardness of the material shall be not less than 75 nor more than 90 when tested according to ASTM D2240 after the material has cured for 72 hours at 23±2°C.

4.1.8 Tensile Strength -- The tensile strength of the material, when tested according to ASTM D 638, shall not be less than 41,370 kPa (6,000 psi.) after 72 hours cure at 23±2°C.

4.1.9 Compressive Strength -- The compressive strength of the material, when tested according to ASTM D 695, shall not be less than 82,700 kPa (12,000 psi.) after 72 hours cure at 23±2°C.

4.1.10 Shelf Life -- The individual components shall not require mixing prior to use when stored for a period of 12 months.

4.2 Glass Beads

4.2.1 Glass beads shall meet the requirements of AASHTO M247, Type I, and:

a. Coatings -- the beads shall be treated according to the manufacturers recommendations and meet the requirements of Section 4.4.2 of M247, and
b. Roundness-- the beads shall have a roundness of at least 80%.

4.2.2 For 380 µm (15 mil) applications, glass beads shall be applied at a rate of at least 3.0 kg/L (25 lb./gal.). **A greater bead application rate may be necessary for meeting the performance criteria (minimum levels of retroreflectivity). This will require contractors to consult with all the material manufacturers.**

4.3 Time to No-Track -- Type I material shall be in "no-tracking" condition in 15 minutes or less and within 45 minutes for Type II material. The "no-tracking" condition shall be determined on an application of specified thickness to the pavement and covered with glass beads at the rate of at least 3.0 kg/L (25 lb./gal.). The lines for this test shall be applied with striping equipment operated so as to have the material at manufacturer's recommended application temperature. This maximum "no-tracking" time shall not be exceeded when the pavement temperature varies from 10 to 49° C (50 to 120° F) and under all humidity conditions, providing the pavement is dry. The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck at a speed of 40 to 55 kmph (25 to 35 mph) in a simulated passing maneuver. A line showing no visual deposition of the material to the pavement surface when viewed from a distance of 15 m (50 ft.) shall be considered as showing "no-tracking" and conforming to this requirement for time to "no-track."

5.0 APPLICATION EQUIPMENT AND PROCEDURES

5.1 Equipment

5.1.1 Equipment furnished shall include an applicator truck of adequate size and power, designed to apply an epoxy resin material and glass beads in a continuous or intermittent line pattern. The equipment shall be capable of placing stripes on the left and right sides. The left carriage shall be capable of placing two lines simultaneously with either line in a solid or intermittent pattern in yellow or white. With change in color usage, an amount of material equal to fifteen 3 m (10 ft.) stripes shall be wasted to eliminate the change of the incorrect color being applied.

5.1.2 The applicator truck (striper) and other vehicles in the striping train shall have permanently mounted Type C flashing arrowboards. They shall be visible to oncoming or following traffic, depending on the type of line being placed. Arrowboard requirements are detailed in the "Field Manual" of the *Minnesota Manual of Traffic Control Devices*. Also, truck equipment shall be capable of accumulating the footage applied per gun, individually each day. Only material application shall activate the footage accumulators. The readout shall be digital and not adjustable.

5.1.3 The equipment shall be capable of applying glass beads in a pressurized system at a rate of at least 3.0 kg/L (25 lb./gal.). **A greater bead application rate may be necessary for meeting the performance criteria (minimum levels of retroreflectivity). This will require contractors to consult with all the material manufacturers.**

5.1.4 All guns on the spray carriages shall be in full view of the operator(s) during operation.

5.1.5 Each crew shall include at least one technical expert knowledgeable in equipment operation, application techniques, control of traffic, and safety regulations.

5.2 Procedures

5.2.1 Pavement markings shall be placed in accordance with the details shown in the Plans and the control points established by the Engineer.

5.2.2 The road surface shall be cleaned at the direction of the Engineer just prior to an application. Pavement cleaning shall consist of at least brushing with a rotary broom (non-metallic), or as recommended by the material manufacturer and acceptable to the Engineer. New Portland cement concrete surfaces shall be sandblasted clean to remove any surface treatments and/or laitance. On low speed [Speed Limit 65 km/h (40 mph) or less] urban portland cement concrete roadways, sandblast cleaning shall be used for all epoxy pavement markings.

5.2.3 If the roadway surface is dry, the epoxy material application shall immediately follow the pavement cleaning and be preceded by an air blast. However, markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface before the material can be applied.

5.2.4 The Engineer will place necessary spotting at appropriate points as overall horizontal control for striping and to indicate necessary starting and cutoff points. Broken line intervals will not be marked. Longitudinal joints, pavement edges, and existing markings shall serve as control points when so directed.

5.2.5 A 380 μm (15 mil) epoxy line requires a liter of mixed components for every 25.8 m (84.5 ft.) of 100 mm (4 in.) wide line. Field measurements are inserted into the following equation: Line Thickness in micrometers = Liters x 0.001 x 10^{-3} x m^3 divided by the quantity Length in meters x width in meters (Thickness in inches = Gallons x 231 cubic inches divided by the quantity Length (inches) x Width (inches)). Use 3.785 liters per gallon if epoxy is metered in gallons.

5.2.6 The minimum line width shall be its nominal width with 6 mm (¼ in.) greater than the nominal width allowed provided the variation is gradual and does not detract from the general appearance. Broken line segments, normally 2 m (6.56 ft.) every 10 m (32.81 ft.), may vary up to 75 mm (3 in.) from the specified lengths provided the over and under variations are reasonably compensatory. Alignment deviations from the control guide shall not exceed , except when approved by the Engineer. Material shall not be applied over a longitudinal joint. Establishment of application tolerances shall not relieve the Contractor of his responsibility to comply as closely as practicable with the planned dimensions.

5.3 Spraying Operation

5.3.1 Placement of epoxy materials shall be permitted only on a clean, dry pavement surface and air and pavement temperatures at least 10° C (50° F) unless the manufacturer, in writing, approves a lower temperature.

5.3.2 Two parts of epoxy component A (pigment) and one part component B (hardener) shall be heated separately at 43°±1° C (110°±30° F) and thoroughly mixed. All material heated over 60° C (140° F) shall be discarded. The sprayed epoxy shall be applied at 43°±1° C (110°±30°F) **or as recommended by the manufacturer**.

5.3.3 Glass beads shall be applied immediately after the placement of the epoxy. If two bead gradations are required by the Special Provisions, two bead dispensers are required to deliver the specified drop rates. Otherwise the dispenser system must deliver at a minimum 3.0 kg (25 lb./gal.) of beads per liter of epoxy material. **A greater bead application rate may be necessary for meeting the performance criteria (minimum levels of retroreflectivity). This will require contractors to consult with all the material manufacturers.**

5.3.4 The Contractor shall cooperate with inspection personnel in reviewing operation of the equipment, safety precautions, measurement of materials (components and beads), computations to determine specific and daily application rates, sampling materials, making other measurements, such as epoxy thickness, and notifications as to work schedule.

5.3.5 **Only Type II epoxy material shall be used for epoxy pavement markings except when specified as otherwise in the Special Provisions.**

5.3.6 Traffic control for the pavement marking operations shall be in substantial conformance with the "Field Manual," *Minnesota Manual of Uniform Traffic Control Devices* . **A shadow vehicle with a truck-mounted attenuator shall be used on high speed [SPEED LIMIT (65 km/h) (40 mph) and greater], high volume (ADT 1500 and greater) highways.**

6.0 SAMPLING RATE & PROCEDURES

6.1 One pint samples of each manufacturer's lot or batch furnished for the contract shall be **submitted to Mn/DOT at the time of manufacturing.** One pint samples of both Part A (yellow/white) & part B must be submitted to the Mn/DOT Materials Laboratory, 1400 Gervais Ave., Maplewood, Minnesota 55109. (612) 779-5550 or 5549, FAX: (612) 779-5616. Samples shall be identified as follows:

1. Manufacturer's Name
2. Manufacturer's Product Number
3. Lot/Batch Number
4. Date Manufactured
5. Color
6. Intended state project numbers.

6.2 Contractors will not be allowed to use material that has not meet the requirements of Sections 6.1 & 7.0. Contractors will be asked to remove material that does not conform to Sections 6.1 & 7.0 and replace with material that does.

7.0 CERTIFICATIONS

7.1 The manufacturer shall certify that the components meet the requirements of these specifications and are on the Mn/DOT Approved Product List.

7.2 Certifications shall be sent along with the samples in section 6.1.

8.0 CONTAINER MARKINGS

8.1 Containers for epoxy components shall be marked with the manufacturer's name, product identification number, lot or batch number, date of manufacture, color, net weight of contents.

8.2 Containers for glass beads shall be marked with the name of manufacturer, the wording "Glass Beads," lot or batch number, coating type, date manufactured, and the net weight.

9.0 ACCEPTANCE OF PAVEMENT MARKINGS

In order to be a long-life pavement marking, epoxy markings placed in Minnesota must retain a satisfactory level of retroreflectivity in addition to demonstrating good adhesion, resisting chipping, and exhibiting proper daytime and nighttime colors. These attributes have been observed and evaluated for several years and are the basis for acceptance/rejection procedures and values used herein.

9.1 Retroreflectivity

9.1.1 Acceptable Minimum Retroreflectivity Values

MINIMUM AVERAGE RETROREFLECTIVITY VALUES
FOR EPOXY MARKINGS
($mcd/m^2/lux$)

Period	White	Yellow
Initial*	300	200
After-One-Winter*	175	140

* Described in Section 9.1.4 Miscellaneous Traffic Controls, Numbers 4 and 5.

9.1.2 Retroreflectometers-- Measurements shall be taken with either a portable or mobile retroreflectometer conforming to 30-meter geometry which is defined as: the entrance angle (the angle between the illumination axis and the retroreflector axis) shall fall between 88.50° and 88.76° and the observation angle (the angle between the illumination axis and the observation axis) shall fall between 1.0° and 1.05°; and, the co-viewing angle (the complement of the entrance angle) shall fall between 2.29° and 2.50°. All retroreflectivity readings and data analysis will be provided by Mn/DOT at no cost to the Contractor. Mn/DOT reserves the right to:

- make daytime and/or nighttime visual inspections with or without the presence of the Contractor's representative, mainly to locate obvious or suspect areas of deficiency, and
- determine retroreflectivity of symbols, legends and lines wider than 200 mm (8 in.) using the portable retroreflectometer only.

9.1.3 Test Segments -- The following methodology will be used to evaluate retroreflectivity performance of in-service longitudinal line pavement markings:

LENGTH AND NUMBER OF TEST SEGMENTS[a] PER ROADWAY[b] PER LINE TYPE[c]

Length of Roadway	Number of Test Segments	Length of Test Segments
Less than 1.5 km (1 mi.)	1	300 m (0.2 mi.)
Greater than or equal to 1.5 km (1 mi.)	1 per 1.5 km (1 mi.)	300 m (0.2 mi.)

[a] TEST SEGMENTS-- Areas of a roadway chosen for measuring retroreflectivity of the line types.

[b] ROADWAY--As used here, means that portion of a street or highway ordinarily used for vehicular traffic. In the event a street or highway includes two or more separate roadways, the term roadway shall refer to each roadway separately.

[c] LINE TYPE-- Longitudinal lines of the same color and function. For example, white and yellow edge lines are each a line type.

9.1.4 Measurements in Test Segments

Portable Retroreflectometer

1. Take a minimum of 20 readings in each test segment per line type.
2. On broken lines (skip striping), measure every other stripe, taking no more than two readings per stripe with readings 0.5 m (20 in.) from the ends of the marking.
3. For solid lines, divide test segment into ten areas of 30 m (100 ft.); space readings a minimum of 10 m (33 ft.) and a maximum of 30 m (100 ft.) apart.
4. For 10 percent of each message type, take 5 readings on each message line; for 10 percent of each symbol type, take 5 readings on each symbol.
5. Upon completion of the evaluation, regardless of the results, additional test segments may be ordered by the Engineer.

Mobile Retroreflectometer

1. Calibration of the instruments shall be in accordance with the manufacturer's instructions.
2. Retroreflectivity shall be measured at a minimum rate of 20 percent of each roadway length by line type.
3. Should another mobile unit be available, the maximum acceptable deviation for measurements made by the two different instruments of the same manufacturer and for the same roadway length shall be ± 10%.
4. Repeatability for the given mobile unit shall be ± 6%.
5. Upon completion of the evaluation, regardless of the results, additional test segments may be ordered by the Engineer.

Miscellaneous Controls

1. Take measurements on a clean, dry roadway.
2. Collect data in direction of traffic flow.
3. Measurement units are: $mcd/m^2/lux$.

4. Wait at least two (2) weeks from date of placement of the markings before taking initial readings.
5. Take after-one-winter readings in May or June to assure that spring rains have cleaned the beads.
6. Randomly select test segments unless night reviews or other knowledge supersedes a random selection process.
7. Measure each line type separately.
8. The Engineer may request additional readings or test segments.
9. In the event LASERLUX is not available, the Engineer may require the use of the portable retroreflectometer or establish an alternative evaluation plan.

9.1.5 Contents of Retroreflectivity Report

The report shall consist of:

- State Project number
- Trunk Highway number
- Test date
- Geographical location of the test site(s), including distance from the nearest permanent site identification, such as a reference point.
- Identification of the pavement marking material tested: type, color, age, and transverse location on the road
- Identification of the retroreflectometer
- Remarks concerning the overall condition of the line, messages and symbols such as carryover of asphalt, snow plow damage, uneven distribution of beads, etc.
- Average of the readings for each test segment with one standard deviation calculated.
- Average of the readings for each message and symbol type.

9.2 Correction of Defects/Penalties

1. All pavement markings not conforming to the requirements of the Contract shall be removed and replaced or otherwise repaired to the satisfaction of the Engineer. Removal of unacceptable work shall be accomplished with suitable blasting or grinding equipment unless other means are authorized by the Engineer.
2. Where yield computations show a deficiency in material usage of not more than 20 percent, Mn/DOT may require satisfactory repair or may accept the work at a reduced unit price which is in direct proportion to the percent of the deficiency. Where the deficiency in material usage exceeds 20%, Mn/DOT may require removal and replacement to the satisfaction of the Engineer unless other means are approved by the Engineer.
3. If the Engineer requires removal and replacement, the contractor shall remove (by an approved process) at least 90% of the deficient line, with no excessive scarring of the existing pavement. The removal width shall be one inch wider all around the nominal width of the pavement marking to be removed.

4. Where initial retroreflectivity falls below the minimum acceptable levels but not more than 20%, the Engineer may require satisfactory repair or may accept the work at a reduced unit price which is in direct proportion to the percent of the deficiency. Where the deficiency in retroreflectivity exceeds 20%, i.e., less than 240 mcd/m^2/lux for white and 160 mcd/m^2/lux for yellow, the Engineer may require the removal and replacement to the satisfaction of the Engineer unless other means are approved by the Engineer. Where minimum levels after one winter fall below the specified levels (170 mcd/m^2/lux - 135 mcd/m^2/lux), Mn/DOT will notify the project contractor and manufacturer(s) of the failure. If the initial readings were above Mn/DOT's specified initial minimum levels (300 mcd/m^2/lux - 200 mcd/m^2/lux), the Engineer, contractor, and manufacturer(s) of the material(s) shall review the project together. Based on the review an of all known aspects, the Engineer will make a determination as to why the job failed and notify the Contractor, pavement marking contractor, and/or manufacturer(s) in writing.
5. If this process has to be repeated on several projects with either the same contractor and/or manufacturer(s), Mn/DOT will take corrective action. This corrective action will be a two step process:

   Step 1 Pavement marking contractor/manufacturer(s) will be considered not approved for Mn/DOT projects, except to bring workmanship/product back into compliance.

   Step 2 If the first step cannot be attained, pavement marking contractor/ manufacturer(s) will not be allowed to participate in Mn/DOT projects and/or be removed from Approved Product List.

10.0 DOCUMENTATION

~~Contractors applying epoxy pavement markings for Mn/DOT under a contract **are required** to fill out the attached "Construction Striper Operations Daily Log" form. These forms shall be completed at the end of each project and faxed to the "Reflective Systems Unit" at (612) 797-3181 Attn: Jim Carlson. **Failure to submit completed forms may result in 10% of the overall contract price for epoxy pavement markings held back.** Also, if forms are not sent in to the reflective systems unit in a timely manner projects will not be inspected during optimum times for meeting their performance criteria. Any questions regarding this form can be answered by calling the Reflective Systems Unit at (612) 797-3183.~~

S-262.1 Section 10.0 of the attached "Specification for Epoxy Resin Pavement Markings" is hereby deleted and the following substituted therefore:

Contractors applying epoxy pavement markings for Mn/DOT under a contract are required to fill out the attached "Construction Striping Report" form. These forms shall be completed at the end of each project. The original shall be given to the Engineer. Failure to submit completed forms may result in 10% of the overall contract price for epoxy pavement markings held back. The Engineer will fax them "ATTN: Pavement Marking Engineer" at 651-234-7370. If forms are not sent in to the reflective systems unit in a timely manner projects will not be inspected during optimum times for meeting their performance criteria. Any questions regarding this form can be answered by calling the Pavement Marking Engineer at (651) 234-7373. The form is on the website at: http://www.dot.state.mn.us/trafficeng/products/ContractorStripingDailyReportForm.doc

January 16, 1998

MINNESOTA DEPARTMENT OF TRANSPORTATION
SPECIFICATION
THREE MINUTE DRY ALKYD TRAFFIC PAINTS

I. SCOPE

This specification covers solvent based fast-dry white and yellow alkyd traffic marking paints for use with drop-on glass beads for application on concrete and bituminous pavements at spray temperatures of up to 160^0F. When applied with glass beads, the paint shall dry to a no-track condition within 3 minutes. The paints shall be free of lead, mercury, cadmium, hexvalent chromium and any other toxic heavy metals.

This paint is intended for use with "dry flow" treated drop-on glass beads applied at a rate of eight pounds per gallon.

II. GENERAL REQUIREMENTS

A. Quality

The paint shall be formulated from first-grade materials and shall be suitable in all respects for application at elevated spray temperatures with drop-on glass beads using conventional traffic striping equipment.

The finished paint shall be smooth and homogeneous, free of coarse particles, skins or any other foreign materials that are detrimental to its use or appearance.

B. Package Stability

Within a period of twelve months from the time of delivery, the paint shall not cake, settle, liver, thicken, skin, curdle, gel or show any other objectionable properties which cannot readily be corrected with minimal stirring. Any paint with properties that make it unsuitable for use within the specified twelve months shall be returned to the supplier for credit.

It shall be the manufacturer's responsibility to add sufficient anti- settling agents, stabilizers and other additives to insure proper storage stability.

C. Manufacturing and Packaging

Manufacturer shall be capable of producing paint in batches of 1,000 gallons or larger. The paint shall be screened with a 40 mesh or finer screen to remove any coarse particles, skins or foreign material.

The paint shall be packaged in new 55 or 5 gallon containers as specified. The drums shall be Full Removable-Head Universal meeting the requirements of DOT-17H; covers shall have one 2-inch and one 3/4 inch fitting. Each container shall be marked with the manufacturer's name, type of paint, batch number, date of manufacture, gross weight and container weight.

III. SPECIFIC REQUIREMENTS

Properties of the finished paint

The exact composition of the paints shall be left to the discretion of the manufacturer, provided the finished paint meets the requirements of this specification.

Weight per gal, white paint, 77^{0}F, lbs. min	11.80
Weight per gal, organic yellow paint, 77^{0}F, lbs. min	11.50
Viscosity, Krebs Stormer, 77^{0}F, K.U.	85 - 100
Grind, Hegman, minimum	3
Total Solids, % by weight, minimum	70
Vehicle Solids, % by weight. of vehicle, minimum	38
Pigment, % by weight,	50 - 56
Titanium Dioxide, white paint, lbs/gal, minimum	1.0
Drying, 15 mil wet thickness, minutes, maximum	8
Daylight Directional Reflectance, white, minimum	83
Daylight Directional Reflectance, yellow, minimum	50
Contrast Ratio, minimum	0.98
Bleeding Ratio, minimum	0.95
Flexibility and Adhesion	No cracking or flaking
Water Resistance	No blistering or loss of adhesion
Settling	Rating of 6 or better
Skinning, 48 hrs	None
Track Free Time, minutes, maximum	3

Lab Retro-reflectivity, white, minimum, mcd/m^2/lux	300
Lab Retro-reflectivity, yellow, minimum, mcd/m^2/lux	200
Field Retro-reflectivity, white, minimum, mcd/m^2/lux	275
Field Retro-reflectivity, yellow, minimum, mcd/m^2/lux	180

Organic Yellow Pigment. The prime pigment in the organic yellow paint shall be Colour Index Pigment Yellow Number 65 or Number 75.

Color. The color of the dry white paint shall be a pure flat white, free of tint. The color of the yellow paint shall closely match Color Number 33538 of Federal Standard 595 and shall conform to the following CIE Chromaticity limits using illuminant "C":

x	0.470	0.485	0.520	0.480
y	0.440	0.460	0.450	0.420

Heavy Metals. The white and organic yellow paints shall be free of lead, mercury, cadmium, hexavalent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency. Lead driers shall not be allowed.

IV. TESTING

Weight Per Gallon	ASTM D 1475
Viscosity	ASTM D 562
Fineness Of Grind	ASTM D 1210
Total Solids	ASTM D 2369
Total Pigment	ASTM D 2371
Titanium Dioxide	ASTM D 4563 ; D 1394
Dry Time (15 mils wet)	ASTM D 711
Daylight Directional Reflectance	ASTM D 2805
Contrast Ratio (15 mils wet)	ASTM D 2805
Bleeding Ratio	Federal Specification TT-P-85
Color	ASTM D 2805
Retro-reflectivity	Mn/DOT Method

Flexibility and Adhesion. Apply 15 mil wet film thickness to 3" by 5" tin panel. Dry at 77^{0}F for 24 hrs followed by 2 hrs at 122^{0}F . When bent over a 1/2" mandrel the paint shall adhere firmly without evidence of cracking or flaking.

Water Resistance. Apply 15 mil wet film thickness to 4" by 8" glass plates; dry at 77^{0}F for 72 hrs. Immerse in distilled water at 77^{0}F for 24 hrs. Allow to air dry for 2 hrs on a flat surface. Paint shall show no blistering or loss of adhesion.

Skinning. After 72 hrs in a tightly sealed 3/4 filled container, the paint shall be free of lumps and skins when strained through a 100 mesh screen.

Settling. A homogeneous sample of paint in a full one-pint triple sealed can shall be inverted for one hour to insure a complete seal between the cover and body of the can. After one hour the can shall be placed upright in a 120^{0}F oven. After 5 days the can shall be cooled to room temperature for 4 hours. When evaluated according ASTM D 869, the degree of settling shall have a rating of 6 or better.

Track Free Time. When applied under the following conditions, the line shall show no visual tracking when viewed from 50 feet after driving a passenger vehicle over the line at a speed of 25-35 mph.

Fifteen mils wet film thickness.
Eight pounds of glass beads per gallon of paint.
Paint temperature at nozzle between 110 - 130^{0}F.
Pavement temperature of 50 to 120^{0}F.

Retro-reflectivity. The lab will draw three - 4 inch wide lines, with wet film thickness of 15±1 mils. Glass beads will be dropped on at a rate of 8 pounds per gallon. A total of 3 readings will be conducted on each sample with a 30 meter geometry LTL 2000. The average of those 9 readings will be the retro-refectivity of the system (paint and beads). The Field studies will be conducted using a 30 meter geometry Laserlux? . These studies will be conducted at random throughout the year.

V. MANUFACTURERS CERTIFICATION

Manufacturer shall submit certified test results with each batch of paint produced for use in Minnesota under this specification. Tests conducted on each batch shall include; weight per gallon, viscosity, and drying time. Testing for all other parameters in this specification shall be carried out annually at the start of production. Certified test results shall be promptly submitted to the Mn/DOT Materials Laboratory at 1400 E. Gervais, Maplewood, Minnesota, 55109.

VI. SAMPLING

All paint manufactured under contract for Mn/DOT shall be inspected at the factory by Mn/DOT personnel or representatives at a frequency determined by Mn/DOT. When the place of manufacture is located outside the boundaries of the State of Minnesota, the manufacturer shall bear all costs of sampling and plant inspection.

For paint ordered by private contractors for use on Minnesota painting contracts, the manufacturer shall submit a one-pint sample of each batch along with a letter certifying the sample represents the full manufactured batch.

The department reserves the right to base acceptance upon samples taken at the point of delivery or from a contractors supply. Sample size shall be one pint.

APPLICATION SPECIFICATION
CONVENTIONAL PAVEMENT MARKING MATERIALS
3 MINUTE DRY ALKYD AND HIGH SOLIDS LATEX

Values stated in the International System of Units SI apply only to projects to be constructed in Metric units of measure. Values stated in inch-pound units (in parenthesis) apply only to projects to be constructed in English units of measure.

Materials

The traffic marking paint shall be yellow or white in color and shall conform to the attached Mn/DOT Specification. ALL MATERIALS shall be free of lead, cadmium, mercury, hexavelent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency.

The material shall be marked as follows:

1. Manufacturer's Name
2. Place of Manufacture
3. Date of Manufacture
4. Color of Material
5. Batch Number

Only material manufactured by a Mn/DOT approved manufacturer will be allowed for use on Mn/DOT projects. The following manufacturers are approved to supply material:

Beads	Quality Paint
Potters, Inc.	Vogel Paints, Inc.
	Linear Dynamics, Inc.
	Centerline Industries, Inc.
	Sherwin Williams, Inc.

A sample from each batch shall be submitted to the Mn/DOT Laboratory for inspection and testing at least 15 days prior to use in the field.

Equipment

Application equipment for permanent markings shall consist of a machine of the spray type capable of applying the material under pressure at a controlled temperature through nozzles equipped with remotely controlled cutoff mechanisms and suitable line guides that will produce clean cut lines and prevent excessive material drift. The marking material shall be applied with truck-mounted traveling units properly equipped to apply the paint stripes as required. Where two or more lines are to be applied closely spaced, the

machine shall be equipped to apply those stripes simultaneously. For application of broken lines, the spray unit shall include an automatic feed control device capable of being set to produce the specified stripe to gap ratio. The truck equipment shall be capable of accumulating the length applied by each gun individually each day. Only material application shall activate the length accumulators. The read out shall be digital and not externally adjustable.

Vehicles in the striper train shall be deployed and equipped with traffic control devices as set forth in the "Field Manual" of the *Minnesota Manual on Uniform Traffic Control Devices*. Additionally, the shadow vehicle shall be equipped with a truck-mounted attenuator on high speed (SPEED LIMIT 65 kmph (40 mph) and greater), high volume (ADT 1500 and greater) highways.

The equipment shall also be capable of applying glass beads by a pressurized system. All guns on the spray carriage shall be in full view of the operators during the spraying operation.

Application

The Engineer will place necessary "spotting" at appropriate points to provide horizontal control for longitudinal striping, determine starting and cutoff points and provide inspection of all work. Broken line intervals will not be marked. The Contractor shall cooperate with inspection personnel and take appropriate actions to assure quality pavement marking installations.

Pavement markings shall only be applied when the air temperature is at least 10 C (50 F) unless the manufacturer, in writing, authorizes a lower temperature. Markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied. No striping operations will be permitted between sundown and sunrise without written permission from the Engineer.

At the time of applying the marking material, the application area shall be free of contamination. The contractor shall clean the roadway surface prior to the line application in a manner and to the extent required by the Engineer.

The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material. Waste material, spent solvents and cleaning materials shall be properly stored and disposed of in accordance with all federal, state and local laws, regulations and ordinances.

Glass beads shall be applied immediately after application of a paint line at a rate of 960 g/L (8 lbs./gal.). Beads shall be evenly distributed on pavement. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line that has been adequately reflectorized with glass beads.

All pavement striping shall be 100 mm (4 in.) wide, unless otherwise specified, and broken line shall be in lengths of 2 m (6.56 ft.) separated by a gap of 8 m (26.25 ft.) for a 10 m (32.81 ft.) cycle length. All pavement striping shall be a minimum of 380 m thick (wet thickness) and the thickness shall be uniform across the width of the line.

A tolerance of 6 mm (¼ in.) over or under the specified width will be allowed for striping provided the variation is gradual and does not detract from the general appearance. Broken line segments may vary up to 75 mm (3 in.) from the specified lengths provided the over and under variations are reasonably compensatory. Alignment deviations from the control guides shall not exceed 50 mm (2 in.). Material shall not be placed over a longitudinal joint. Establishment of application tolerances shall not relieve the contractor of his responsibility to comply as closely as possible with the planned dimensions.

Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be clean cut and square, with a minimum of material beyond the cutoff.

Acceptance/Rejection of Pavement Markings

Acceptance or rejection of pavement markings will be based on thickness and width of material placed as determined by field measurements and yield calculations. Visual observations will determine whether adhesion, chipping and color of the inplace pavement markings is acceptable. The minimum acceptable initial retroreflectivity, as determined in the attached METHOD OF MEASUREMENT FOR DETERMINING AVERAGE RETROREFLECTIVITY shall equal or exceed 275 mcd/m^2/lux for white and 180 mcd/m^2/lux for yellow material, respectively.
All retroreflectivity readings and data analysis will be provided by Mn/DOT at no cost to the Contractor. Mn/DOT reserves the right to:

make daytime and/or nighttime visual inspections with or without the presence of the Contractor's representative, mainly to locate obvious or suspect areas of deficiency,
determine retroreflectivity of symbols, legends and lines wider than 200 mm (8 in.) using a portable unit only, and
accept initial retroreflectivity based on random sampling by color of all markings if computed averages exceed the specified minimum values.

Reduction in Payment

A reduction in pay shall be made for reduced thickness, retroreflectivity and width. Thickness and retroreflectivity shall be computed by random measuring. Thickness shall be computed by the following formula:

$$\text{Thickness (micrometers)} = \frac{\text{Liters} \times 0.001 \text{ meters}^3 \times 10^{-3}}{\text{Length (meters)} \times \text{Width (meters)}}$$

Use 3.785 liters x gallons if paint is metered in gallons.

Example: A 380 micrometers thick paint line requires a liter of material for every 25.8 m of 100 mm wide line.

The equation in English units is:

$$\text{Thickness (inches)} = \frac{\text{Gallons} \times 231 \text{ cubic inches}}{\text{Length (inches)} \times \text{Width (inches)}}$$

And, 1 mil = 0.001 of an inch.

A 15 mil thick 4 inch wide line yields 320 feet per gallon.

Correction of Defects

All pavement markings not conforming to the requirements of the Contract shall be removed and replaced or otherwise repaired to the satisfaction of the Engineer. Removal of unacceptable work shall be accomplished with suitable blasting or grinding equipment unless other means are approved by the Engineer.

Where yield computations show a deficiency in material usage of not more than 20 percent, the Engineer may require satisfactory repair or may accept the work at a reduced unit price which is in direct proportion to the percent of the deficiency. Where the deficiency in material usage exceeds 20 percent, the Engineer may require removal and replacement or otherwise corrected to the satisfaction of the Engineer.

If the Engineer requires removal and replacement of a deficient line, message or symbol, the contractor shall remove, by an approved process, at least 90% of the marking material without excessive scarring the existing pavement. The removal width shall be approximately 25 mm (1 in.) wider all around the deficient marking.

Where initial reflectivity readings fall below the minimum acceptable levels by not more than 20%, the Engineer may require satisfactory repair or may accept the work at a reduced unit price which is in direct proportion to the percent of the deficiency. Where the deficiency in retroreflectivity exceeds 20 percent, i.e., less than 220 mcd/m^2/lux for white and 145 mcd/m^2/lux for yellow, the Engineer may require removal and replacement or otherwise corrected to his satisfaction.

If this process has to be repeated on several projects with either the same Contractor, subcontractor and/or manufacturer(s), Mn/DOT will take corrective action. This corrective action will be a two step process:

Step 1 Pavement marking contractor/manufacturer(s) will be considered not approved for Mn/DOT projects, except to bring workmanship/product back into compliance.

Step 2 If the first step cannot be attained, the pavement marking contractor/manufacturer(s) will not be allowed to bid on Mn/DOT projects and/or will be removed from product lists.

METRIC (ENGLISH)

METHOD OF MEASUREMENT FOR DETERMINING AVERAGE RETROREFLECTIVITY

Measurements shall be taken with either a portable or mobile retroreflectometer conforming to 30-meter geometry which is defined as: the entrance angle (the angle between the illumination axis and the retroreflector axis) shall fall between 88.50 and 88.76 and the observation angle (the angle between the illumination axis and the observation axis) shall fall between 1.0 and 1.05 ; and, the co-viewing angle (the complement of the entrance angle) shall fall between 2.29 and 2.50 .

The following methodology will be used to evaluate retroreflectivity performance of in-service longitudinal line pavement markings:

LENGTH AND NUMBER OF TEST SEGMENTS[a] PER ROADWAY[b] PER LINE TYPE[c]

Length of Roadway	Number of Test Segments	Length of Test Segments
1.5 km (1 mi.)	1	300 m (0.2 mi.)
Greater than or 1.5 km (1 mi.)	1 per 1.5 km (1 mi.)	300 m (0.2 mi.)

[a] TEST SEGMENTS-- Areas of a roadway chosen for measuring retroreflectivity of the line types.

[b] ROADWAY--As used here, means that portion of a street or highway ordinarily used for vehicular traffic. In the event a street or highway includes two or more separate roadways, the term roadway shall refer to each roadway separately.

[c] LINE TYPE-- Longitudinal lines of the same color and function. For example, white and yellow edge lines are each a line type.

Measurements in Test Segments

PORTABLE RETROREFLECTOMETER

1. Take a minimum of 10 readings in each test segment per line type.
2. On broken lines (skip striping), take no more than two readings per stripe, with readings 0.5 m (20 in.) from ends of marking.
3. For solid lines, divide test segment into ten areas of 30 m (100 ft.); space readings a minimum of 10 m (32.81 ft.) and a maximum of 30 m (100 ft.) apart.
4. For 10 percent of each message type, take 5 readings on each message line; for 10 percent of each symbol type, take 5 readings on each symbol.
5. Upon completion of the evaluation, regardless of the results, additional test segments may be ordered by the Engineer.

MOBILE RETROREFLECTOMETER

1. Calibration of the instruments shall be in accordance with the manufacturer's instructions.
2. Retroreflectivity shall be measured at a minimum rate of 10 percent of each roadway length by line type.
3. Should another mobile unit be available, the maximum acceptable deviation for measurements made by the two different instruments of the same manufacturer and for the same roadway length shall be ± 10%.
4. Repeatability for the given mobile unit shall be ± 6%.
5. Upon completion of the evaluation, regardless of the results, additional test segments may be ordered by the Engineer.

MISCELLANEOUS CONTROLS

1. Take measurements on a dry, clean roadway.
2. Collect data in direction of traffic flow.
3. Measurement units are $mcd/m^2/lux$.
4. Wait at least two (2) weeks from date of placement of the markings before taking initial readings.
5. Randomly select test segments unless night reviews or other knowledge supersedes a random selection process.
6. The Engineer may request additional readings or test segments.
7. Measure each line type separately.
8. In the event LASERLUX is not available, the Engineer may require the use of the portable retroreflectometer or establish an alternative evaluation plan.

Contents of Retroreflectivity Report

The Report shall consist of:

State Project number.
Trunk Highway number.
Test date.
Geographical location of the test site(s), including distance from the nearest permanent site identification, such as a reference point.
Identification of the pavement marking material tested: type, color, age, and transverse location on the road.
Identification of the retroreflectometer.
Remarks concerning the overall condition of the lines, messages and symbols such as carryover of asphalt, uneven distribution of beads, etc.
Average of the readings for each test segment with one standard deviation calculated.
Average of the readings for each type of message and symbol.

January 16, 1998

MINNESOTA DEPARTMENT OF TRANSPORTATION
SPECIFICATION
DROP-ON GLASS BEADS

I. SCOPE

This specification covers treated glass beads for reflectorizing traffic marking paint.

II. GENERAL REQUIREMENTS

Beads for use with solvent-based paints will have a "dry flow" type surface treatment.

Beads for use with water-based paints will have a dual surface treatment consisting of a moisture resistant silicone treatment, and a silane adherence surface treatment.

Beads for use with epoxy paints will have a moisture resistant silicone surface treatment.

The beads will be made from clean colorless transparent glass. They will be smooth, spherically shaped, and free from milkiness, pits, excessive air bubbles, chips and foreign material. The beads will be suitable for application using conventional striping equipment, and will produce a retro-reflectorized line when viewed at night with automobile headlights.

III. SPECIFIC REQUIREMENTS

The glass beads will meet the requirements of AASHTO M 247 Type 1 "standard gradation" except the beads will have a minimum of 80 percent true spheres.

The dual treated beads will meet the moisture resistant requirements of AASHTO M 247 Section 4.4.2 and pass the adherence treatment Dansyl Chloride Test.

The moisture resistant silicone treated beads will meet AASHTO M 247 Section 4.2.2.

IV. SAMPLING AND TESTING

A. SAMPLING

The beads will be sampled at the rate of one sample per 4,000 kg (10,000 lbs) of beads. For beads shipped in 22 kg (50 lbs) bags a sample will consist of two bags selected at random and reduced to approximately one quart using a sample splitter. For bulk shipments, sampling will be by means of a perforated tube type "sampling thief." Three samples from each of three separate containers will be combined for one sample.

B. TESTING

Testing will be according to the requirements of AASHTO M 247.

Adherence coating will be tested by the Dansyl Chloride Method on file at the Mn/DOT Materials Laboratory.

Retroreflectivity will be determined by the Mn/DOT Method.

1. 3 draw downs (100 mm wide, 15 mil wet thickness) will be conducted in the lab for each color of paint.

2. Glass beads will be dropped on at a rate of 3.6 kg (8 lbs) per gallon.

3. 3 readings will be taken per draw down.

4. The average of those 9 readings will be the retroreflectivity of the system (paint and beads).

Roundness will be determined by the Mn/DOT Method detailed below.

Mn/DOT Method for Determining Roundness of Glass Beads.

1. Reduce sample to 25 to 50 grams by means of a sample splitter. Weigh to the nearest 0.01 grams.

2. Split the reduced sample into two fractions using a 297 μm (No. 50) sieve.

3. To separate rounds from imperfects, a smooth, 30 mm by 45 mm (12 in by 18 in), inclined glass or aluminum plate is used. The plate is inclined at approximately 3 degrees for the +297 µm (+50) fraction and at approximately 10 degrees for the -297 µm (-50) fraction.

Slowly apply part of the beads to the top of the plate. Tap the plate with a wooden pencil or brush to cause round beads to roll down the incline into a collecting pan. Brush the remaining beads into a separate collecting pan. Continue with small applications until the entire sample is processed. Repeat the process with beads that rolled off plate at least three times for the +297 µm (+50) fraction and at least four times for the -297 µm (-50) fraction.

4. Weigh the separated fractions of round beads and calculate percent rounds.

V. PACKAGING

Unless otherwise specified the beads will be packaged in moisture-proof multi-wall shipping bags.

Each container will be marked with name and address of the manufacturer, type of moisture treatment, batch number and date of manufacture.

The containers and contents will be delivered in a good, dry condition.

Any beads not meeting the requirements of this specification or delivered in an unusable condition will be rejected.